

MTH301 Calculus II

Mid Term Examination – Spring 2006

Time Allowed: 90 Minutes

Please read the following instructions carefully before attempting any of the questions:

1. Attempt all questions. Marks are written adjacent to each question.
2. Do not ask any questions about the contents of this examination from anyone.
 - a. If you think that there is something wrong with any of the questions, attempt it to the best of your understanding.
 - b. If you believe that some essential piece of information is missing, make an appropriate assumption and use it to solve the problem.
 - c. Write all steps, missing steps may lead to deduction of marks.
3. Calculator is allowed.

****WARNING: Please note that Virtual University takes serious note of unfair means. Anyone found involved in cheating will get an `F` grade in this course.**

Question No. 1

Marks : 5

Find the directional derivative $D_{\vec{u}} f(1, -1, 1)$ of $f(x, y, z) = x^2z + y^3z^2 - xyz$ in the direction of $\vec{u} = (-1, 0, 3)$ at the point $(1, -1, 1)$.

Question No. 2

Marks : 1

$$\int \frac{1}{4x^2 + x} dx = \ln|4x^2 + x| + c$$

★ True.

★ False

Question No. 3

Marks : 10

Find

$\frac{\partial z}{\partial s}$ and $\frac{\partial z}{\partial t}$, where $z(s, t) = f(r(s, t), \theta(s, t))$,

$f(r, \theta) = e^{2r} \sin(3\theta)$, $r(s, t) = st - t^2$, $\theta(s, t) = \sqrt{s^2 + t^2}$

Question No. 4

Marks : 10

Compute the volume of the solid bounded by the given surface

$z = 1 - y$, $z = 0$, $y = 0$, $x = 1$, $x = 2$

Question No. 5

Marks : 1

Not all critical points need to be local extrema.

★ True.

★ False

Question No. 6

Marks : 1

$f(x, y) = \sqrt{3 - x^2 - y^2}$ is continuous at

★ $x^2 + y^2 = 3$

★ $x^2 + y^2 \geq 3$

★ $x^2 + y^2 \leq 3$

★ $x^2 + y^2 < 3$

Question No. 7

Marks : 5

Find an equation of the plane through the origin that is parallel to the plane:

$$4x - 2y + 7z + 12 = 0$$

Question No. 8

Marks : 10

Use double integrals to compute the area of the region bounded by the curves:

$$y = x^2 \quad \text{and} \quad y = 8 - x^2$$

Question No. 9

Marks : 1

If $f'(a)$ is +ve then the graph of function is concave up.

★ True.

★ False

Question No. 10

Marks : 1

Direction cosines of straight line through A(1,1,1) and B(0,0,-1) are

★ $\frac{2}{3}, \frac{2}{3}, \frac{1}{3}$

★ $\frac{2}{\sqrt{3}}, \frac{-1}{\sqrt{3}}, \frac{1}{\sqrt{3}}$

★ $\frac{1}{\sqrt{6}}, \frac{1}{\sqrt{6}}, \frac{2}{\sqrt{6}}$

★ None of these.

FINALTERM EXAMINATION

Fall 2009

MTH301- Calculus II

Question No: 1 (Marks: 1) - Please choose one

π is an example of -----

- ▶ **Irrational numbers**
- ▶ Rational numbers
- ▶ Integers
- ▶ Natural numbers

Question No: 2 (Marks: 1) - Please choose one

Straight line is a special kind of -----

- ▶ Surface
- ▶ **Curve**
- ▶ Plane
- ▶ Parabola

Question No: 3 (Marks: 1) - Please choose one

An ordered triple corresponds to ----- in three dimensional space.

- ▶ **A unique point**

- ▶ A point in each octant
- ▶ Three points
- ▶ Infinite number of points

Question No: 4 (Marks: 1) - Please choose one

The angles which a line makes with positive x ,y and z-axis are known as -----

- ▶ Direction cosines
- ▶ Direction ratios
- ▶ Direction angles

Question No: 5 (Marks: 1) - Please choose one

Is the function $f(x, y)$ continuous at origin? If not, why?

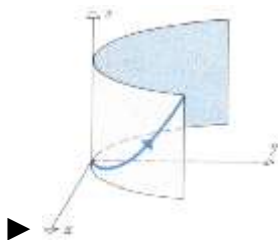
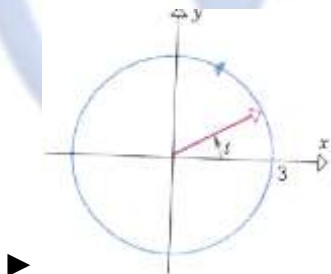
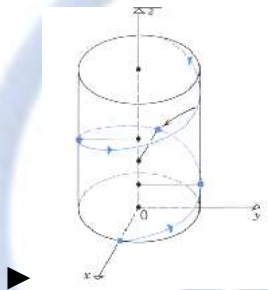
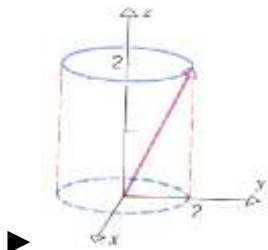
$$f(x, y) = 4xy + \sin 3x^2y$$

- ▶ $f(x, y)$ is continuous at origin
- ▶ $f(0, 0)$ is not defined
- ▶ $f(0, 0)$ is defined but $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$ does not exist
- ▶ $f(0, 0)$ is defined and $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$ exists but these two numbers are not equal.

Question No: 6 (Marks: 1) - Please choose one

Match the following vector-valued function with its graph.

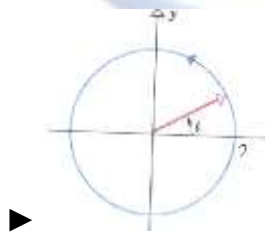
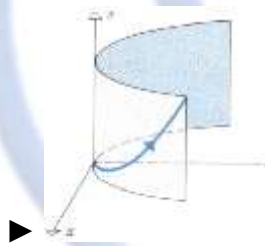
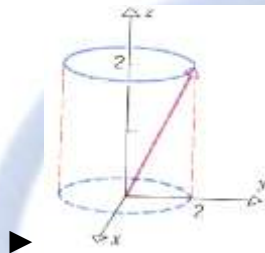
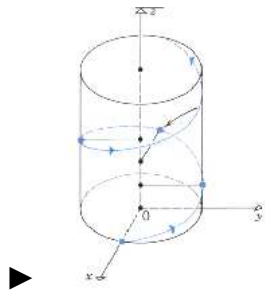
$$r(t) = 3\cos t \hat{i} + 3\sin t \hat{j} \quad \text{and} \quad 0 \leq t \leq 2\pi$$



Question No: 7 (Marks: 1) - Please choose one

Match the following vector-valued function with its graph.

$$r(t) = t\hat{i} + t^2\hat{j} + t^3\hat{k} \quad \text{and} \quad t \geq 0$$



Question No: 8 (Marks: 1) - Please choose one

What are the parametric equations that correspond to the following vector equation?

$$\vec{r}(t) = \sin^2 t \hat{i} + (1 - \cos 2t) \hat{j}$$

- ▶ $x = \sin^2 t$, $y = 1 - \cos 2t$, $z = 0$
- ▶ $y = \sin^2 t$, $x = 1 - \cos 2t$, $z = 0$
- ▶ $x = \sin^2 t$, $y = 1 - \cos 2t$, $z = 1$
- ▶ $x = \sin^2 t$, $y = \cos 2t$, $z = 1$

Question No: 9 (Marks: 1) - Please choose one

Is the following vector-valued function $\vec{r}(t)$ continuous at $t=0$? If not, why?

$$\vec{r}(t) = (4 \cos t, \sqrt{t}, 4 \sin t)$$

- ▶ $\vec{r}(0)$ is not defined
- ▶ $\vec{r}(0)$ is defined but $\lim_{t \rightarrow 0} \vec{r}(t)$ does not exist
- ▶ $\vec{r}(0)$ is defined and $\lim_{t \rightarrow 0} \vec{r}(t)$ exists but these two numbers are not equal.
- ▶ $\vec{r}(t)$ is continuous at $t=0$

Question No: 10 (Marks: 1) - Please choose one

What is the derivative of following vector-valued function?

$$\vec{r}(t) = (\cos 5t, \tan t, 6 \sin t)$$

▶ $\vec{r}'(t) = \left(\frac{\sin 5t}{5}, \sec t, 6 \cos t \right)$



▶ $\vec{r}'(t) = \left(-\frac{\sin 5t}{5}, \sec t, 6 \cos t \right)$



▶ $\vec{r}'(t) = (-5 \sin 5t, \sec^2 t, 6 \cos t)$

▶ $\vec{r}'(t) = (\sin 5t, \sec^2 t, -6 \cos t)$

Question No: 11 (Marks: 1) - Please choose one

The following differential is exact

$$dz = (3x^2y + 2) dx + (x^3 + y) dy$$

▶ True

▶ False

Question No: 12 (Marks: 1) - Please choose one

The following differential is exact

$$dz = (3x^2 + 4xy) dx + (2x^2 + 2y) dy$$

▶ True

► False

Question No: 13 (Marks: 1) - Please choose one

Which one of the following is correct Wallis Sine formula when n is odd and $n \geq 3$?

►
$$\int_0^{\frac{\pi}{2}} \sin^n x \, dx = \frac{\pi}{2} \frac{(n-1)}{n} \frac{(n-3)}{(n-2)} \frac{(n-5)}{(n-4)} \dots \frac{5}{6} \frac{3}{4} \frac{1}{2}$$

►
$$\int_0^{\frac{\pi}{2}} \sin^n x \, dx = \frac{\pi}{2} \frac{(n)}{(n-1)} \frac{(n-2)}{(n-3)} \frac{(n-4)}{(n-5)} \dots \frac{6}{5} \frac{4}{3} \frac{2}{1}$$

►
$$\int_0^{\frac{\pi}{2}} \sin^n x \, dx = \frac{(n-1)}{n} \frac{(n-3)}{(n-2)} \frac{(n-5)}{(n-4)} \dots \frac{6}{7} \frac{4}{5} \frac{2}{3}$$

►
$$\int_0^{\frac{\pi}{2}} \sin^n x \, dx = \frac{(n)}{(n-1)} \frac{(n-2)}{(n-3)} \frac{(n-4)}{(n-5)} \dots \frac{6}{5} \frac{4}{3} \frac{2}{1}$$

Question No: 14 (Marks: 1) - Please choose one

Which of the following is correct?

►
$$\int_0^{\frac{\pi}{2}} \sin^4 x \, dx = \frac{3}{16}$$

$$\int_0^{\frac{\pi}{2}} \sin^4 x \, dx = \frac{3\pi}{16}$$



$$\int_0^{\frac{\pi}{2}} \sin^4 x \, dx = \frac{3}{8}$$



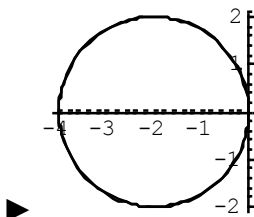
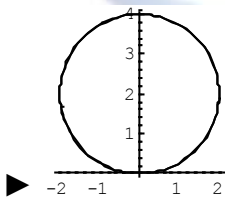
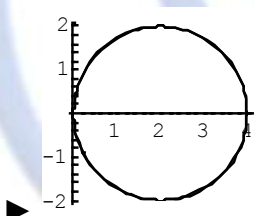
$$\int_0^{\frac{\pi}{2}} \sin^4 x \, dx = \frac{2\pi}{3}$$

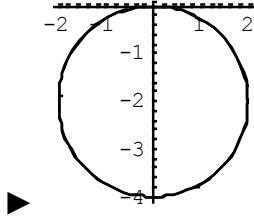


Question No: 15 (Marks: 1) - Please choose one

Match the following equation in polar co-ordinates with its graph.

$$r = 4 \sin \theta$$





Question No: 16 (Marks: 1) - Please choose one

If the equation of a curve, in polar co-ordinates, remains unchanged after replacing (r, θ) by $(r, \pi - \theta)$ then the curve is said to be symmetric about which of the following?

- ▶ Initial line
- ▶ y-axis
- ▶ Pole

Question No: 17 (Marks: 1) - Please choose one

$$f(x) = \sin \frac{x}{2}$$

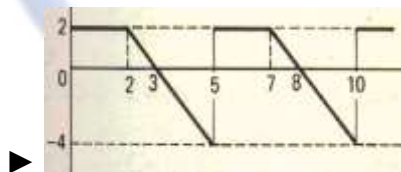
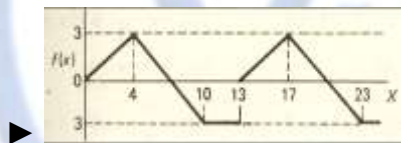
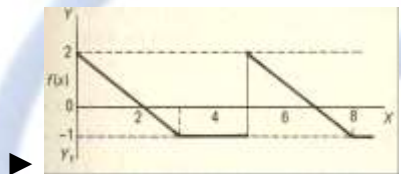
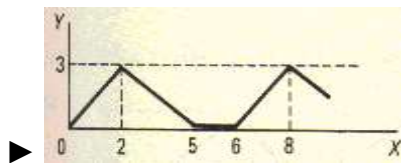
What is the period of a periodic function defined by ?

- ▶ $\frac{\pi}{2}$
- ▶ π
- ▶ $\frac{3\pi}{2}$
- ▶ 4π

Question No: 18 (Marks: 1) - Please choose one

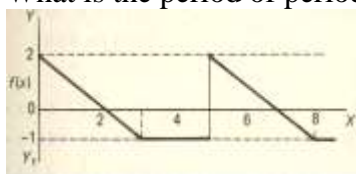
Match the following periodic function with its graph.

$$f(x) = \begin{cases} \frac{3}{4}x & 0 < x < 4 \\ 7 - x & 4 < x < 10 \\ -3 & 10 < x < 13 \end{cases}$$



Question No: 19 (Marks: 1) - Please choose one

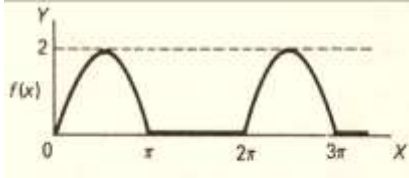
What is the period of periodic function whose graph is as below?



- ▶ 2
- ▶ 3
- ▶ 4
- ▶ 5

Question No: 20 (Marks: 1) - Please choose one

What is the period of periodic function whose graph is as below?



- ▶ 0
- ▶ 2
- ▶ π
- ▶ 2π

Question No: 21 (Marks: 1) - Please choose one

$$\left(-2, \frac{-3\pi}{2}\right)$$

Polar co-ordinates of a point are $\left(-2, \frac{-3\pi}{2}\right)$. Which of the following is another possible polar co-ordinates representation of this point?

- ▶ $\left(2, \frac{-\pi}{4}\right)$

▶ $\left(2, \frac{-\pi}{2}\right)$

▶ $\left(2, \frac{-\pi}{3}\right)$

▶ $\left(2, \frac{3\pi}{4}\right)$

Question No: 22 (Marks: 1) - Please choose one

The function $f(x) = x^3 e^x$ is -----

- ▶ Even function
- ▶ Odd function
- ▶ Neither even nor odd

Question No: 23 (Marks: 1) - Please choose one

The graph of an even function is symmetrical about -----

- ▶ x-axis
- ▶ y-axis
- ▶ origin

Question No: 24 (Marks: 1) - Please choose one

At which point the vertex of parabola, represented by the equation $y = x^2 - 4x + 3$, occurs?

- ▶ (0, 3)
- ▶ (2, -1)
- ▶ (-2, 15)
- ▶ (1, 0)

Question No: 25 (Marks: 1) - Please choose one

The equation $y = x^2 - 4x + 2$ represents a parabola. Find a point at which the vertex of given parabola occurs?

- ▶ (2, -2)
- ▶ (-4, 34)
- ▶ (0, 0)
- ▶ (-2, 14)

Question No: 26 (Marks: 1) - Please choose one

Is the function $f(x, y)$ continuous at origin? If not, why?

$$f(x, y) = \frac{xy}{x^2 + y^2}$$

- ▶ $f(x, y)$ is continuous at origin

- ▶ $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$ does not exist

▶ $f(0, 0)$ is defined and $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$ exists but these two numbers are not equal.

Question No: 27 (Marks: 1) - Please choose one

Sign of line integral is reversed when -----

- ▶ path of integration is divided into parts.
- ▶ path of integration is parallel to y-axis.
- ▶ direction of path of integration is reversed.
- ▶ path of integration is parallel to x-axis.

Question No: 28 (Marks: 1) - Please choose one

What is Laplace transform of a function $F(t)$?

(s is a constant)

- ▶ $\int_0^s e^{-st} F(t) dt$
- ▶ $\int_0^{\infty} e^{st} F(t) dt$
- ▶ $\int_{-\infty}^{\infty} e^{-st} F(t) dt$
- ▶ $\int_0^{\infty} e^{-st} F(t) dt$

Question No: 29 (Marks: 1) - Please choose one

What is the value of $L\{e^{5t}\}$ if L denotes laplace transform?

▶ $L\{e^{5t}\} = \frac{1}{s-5}$

▶ $L\{e^{5t}\} = \frac{s}{s^2+25}$

▶ $L\{e^{5t}\} = \frac{5}{s^2+25}$

▶ $L\{e^{5t}\} = \frac{5!}{s^6}$

Question No: 30 (Marks: 1) - Please choose one

What is the Laplace Inverse Transform of $\frac{1}{s+1}$

▶ $L^{-1}\left\{\frac{1}{s+1}\right\} = t+1$

▶ $L^{-1}\left\{\frac{1}{s+1}\right\} = e^{-t} + e^t$

▶ $L^{-1}\left\{\frac{1}{s+1}\right\} = e^t$

▶ $L^{-1}\left\{\frac{1}{s+1}\right\} = e^{-t}$

Question No: 31 (Marks: 1) - Please choose one

What is Laplace Inverse Transform of $\frac{5}{s^2 + 25}$

▶ $L^{-1}\left\{\frac{5}{s^2 + 25}\right\} = \sin 5t$

▶ $L^{-1}\left\{\frac{5}{s^2 + 25}\right\} = \cos 5t$

▶ $L^{-1}\left\{\frac{5}{s^2 + 25}\right\} = \sin 25t$

▶ $L^{-1}\left\{\frac{5}{s^2 + 25}\right\} = \cos 25t$

Question No: 32 (Marks: 1) - Please choose one

What is $L\{-6\}$ if L denotes Laplace Transform?

▶ $L\{-6\} = \frac{1}{s+6}$

▶ $L\{-6\} = \frac{-6}{s}$

▶ $L\{-6\} = \frac{s}{s^2 + 36}$

▶ $L\{-6\} = \frac{-6}{s^2 + 36}$

Question No: 33 (Marks: 1) - Please choose one

$$\int_C (3x + 2y) dx + (2x - y) dy$$

Evaluate the line integral
from (0, 0) to (2, 0).

where C is the line segment

- ▶ 6
- ▶ -6
- ▶ 0
- ▶ Do not exist

Question No: 34 (Marks: 1) - Please choose one

$$\int_C (2x + y) dx + (x^2 - y) dy$$

Evaluate the line integral
(0, 0) to (0, 2).

where C is the line segment from

- ▶ -4
- ▶ -2
- ▶ 0
- ▶ 2

Question No: 35 (Marks: 1) - Please choose one

Plane is an example of -----

- ▶ Curve
- ▶ Surface

► Sphere

► Cone

Question No: 36 (Marks: 1) - Please choose one

If $R = \{(x, y) / 0 \leq x \leq 2 \text{ and } -1 \leq y \leq 1\}$, then

$$\iint_R (x + 2y^2) dA =$$

► $\int_{-1}^1 \int_0^2 (x + 2y^2) dy dx$

► $\int_0^2 \int_1^{-1} (x + 2y^2) dx dy$

► $\int_{-1}^1 \int_0^2 (x + 2y^2) dx dy$

► $\int_1^2 \int_{-1}^0 (x + 2y^2) dx dy$

Question No: 37 (Marks: 1) - Please choose one

To evaluate the line integral, the integrand is expressed in terms of x, y, z with

▶ $dr = dx\hat{i} + dy\hat{j}$

▶ $dr = dx\hat{i} + dy\hat{j} + dz\hat{k}$

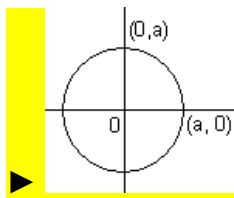
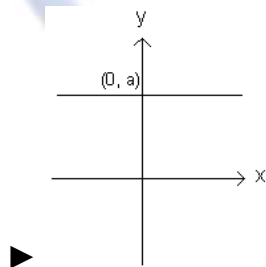
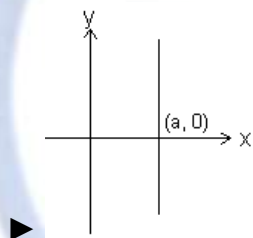
▶ $dr = dx + dy + dz$

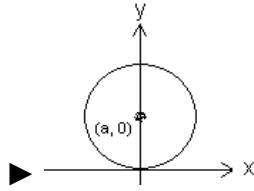
▶ $dr = dx + dy$

Question No: 38 (Marks: 1) - Please choose one

Match the following equation in polar co-ordinates with its graph.
 $r = a$

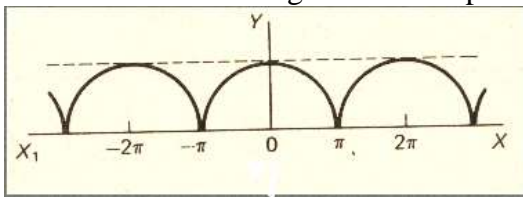
where a is an arbitrary constant.





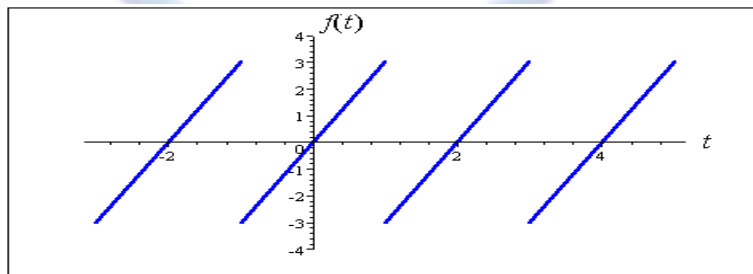
Question No: 39 (Marks: 1) - Please choose one

Which of the following is true for a periodic function whose graph is as below?



- ▶ Even function
- ▶ Odd function
- ▶ Neither even nor odd function

Question No: 40 (Marks: 1) - Please choose one



The graph of “saw tooth wave” given above is -----

- ▶ An odd function

- ▶ An even function

- ▶ Neither even nor odd

Question No: 1 (Marks: 2) - Please choose one

Laplace transform of 't' is

- ▶ $\frac{1}{s}$
- ▶ $\frac{1}{s^2}$
- ▶ e^{-s}
- ▶ s

Question No: 2 (Marks: 2) - Please choose one

Symmetric equation for the line through (1,3,5) and (2,-2,3) is

- ▶ $x-2 = -\frac{y+2}{3} = -\frac{z-3}{5}$
- ▶ $x+2 = -\frac{y+3}{5} = -\frac{z+5}{2}$
- ▶ $x-1 = -\frac{y-3}{5} = -\frac{z-5}{2}$
- ▶ $x+1 = \frac{y+3}{5} = \frac{z-5}{5}$

Question No: 3 (Marks: 1) - Please choose one

The level curves of $f(x, y) = y \csc x$ are parabolas.

- ▶ True.
- ▶ False.

Question No: 4 (Marks: 1) - Please choose one

The equation $z = r$ is written in

- ▶ Rectangular coordinates
- ▶ Cylindrical coordinates
- ▶ Spherical coordinates
- ▶ **None of the above**

Question No: 1 (Marks: 1) - Please choose one

is an example of -----

- ▶ Irrational numbers
- ▶ Rational numbers
- ▶ Integers
- ▶ Natural numbers

Question No: 2 (Marks: 1) - Please choose one

Straight line is a special kind of -----

- ▶ Surface
- ▶ Curve
- ▶ Plane
- ▶ Parabola

Question No: 3 (Marks: 1) - Please choose one

An ordered triple corresponds to ----- in three dimensional space.

- ▶ A unique point
- ▶ A point in each octant
- ▶ Three points
- ▶ Infinite number of points

Question No: 4 (Marks: 1) - Please choose one

The graph of an even function is symmetrical about -----

- ▶ x-axis
- ▶ y-axis
- ▶ origin

Question No: 5 (Marks: 1) - Please choose one

Sign of line integral is reversed when -----

- ▶ path of integration is divided into parts.
- ▶ path of integration is parallel to y-axis.
- ▶ direction of path of integration is reversed.
- ▶ path of integration is parallel to x-axis.

Question No: 6 (Marks: 1) - Please choose one

Plane is an example of -----

- ▶ Curve
- ▶ Surface
- ▶ Sphere
- ▶ Cone

Question No: 7 (Marks: 1) - Please choose one

Let R be a closed region in two dimensional space. What does the double integral over R calculates?

- ▶ Area of R .
- ▶ Radius of inscribed circle in R .
- ▶ Distance between two endpoints of R .
- ▶ None of these

Question No: 8 (Marks: 1) - Please choose one

What is the relation between the direction of gradient at any point on the surface to the tangent plane at that point ?

- ▶ parallel
- ▶ perpendicular

- ▶ opposite direction
- ▶ No relation between them.

Question No: 9 (Marks: 1) - Please choose one

Two surfaces are said to intersect orthogonally if their normals at every point common to them are -----

- ▶ perpendicular
- ▶ parallel
- ▶ in opposite direction

Question No: 10 (Marks: 1) - Please choose one

Which of the following is geometrical representation of the equation $y = x^2$, in three dimensional space?

- ▶ Parabola
- ▶ Straight line
- ▶ Half cylinder
- ▶ Cone

MIDTERM EXAMINATION
MTH301

Question No: 1 (Marks: 1) - Please choose one

Which of the following number is associated to each point on a co-ordinate line?

- ▶ An integer
- ▶ **A real number**
- ▶ A rational number
- ▶ A natural number

Question No: 2 (Marks: 1) - Please choose one

If $a > 0$, then the parabola $y = ax^2 + bx + c$ opens in which of the following direction?

- ▶ **Positive x - direction**
- ▶ Negative x - direction
- ▶ Positive y - direction
- ▶ Negative y - direction

Question No: 3 (Marks: 1) - Please choose one

Rectangular co-ordinate of a point is $(1, \sqrt{3}, -2)$. What is its spherical co-ordinate?

$$\left(2\sqrt{2}, \frac{\pi}{3}, \frac{3\pi}{2} \right)$$

▶

$$\left(2\sqrt{2}, \frac{\pi}{2}, \frac{3\pi}{4} \right)$$

▶

$$\left(2\sqrt{2}, \frac{\pi}{3}, \frac{3\pi}{4} \right)$$

▶

$$\left(\sqrt{2}, \frac{\pi}{3}, \frac{3\pi}{4} \right)$$

▶

Question No: 4 (Marks: 1) - Please choose one

If a function is not defined at some point, then its limit ----- exist at that point.

Two surfaces are said to intersect orthogonally if their normals at every point common to them are -----

- ▶ perpendicular
- ▶ parallel
- ▶ **in opposite direction**

Question No: 11 (Marks: 1) - Please choose one

By Extreme Value Theorem, if a function $f(x, y)$ is continuous on a closed and bounded set R , then $f(x, y)$ has both ----- on R .

- ▶ **Absolute maximum and absolute minimum value**
- ▶ Relative maximum and relative minimum value

Question No: 12 (Marks: 1) - Please choose one

Let the function $f(x, y)$ has continuous second-order partial derivatives $(f_{xx}, f_{yy}$ and $f_{xy})$ in some circle centered at a critical point (x_0, y_0) and let $D = f_{xx}(x_0, y_0) f_{yy}(x_0, y_0) - f_{xy}^2(x_0, y_0)$

If $D > 0$ and $f_{xx}(x_0, y_0) < 0$ then f has -----

- ▶ **Relative maximum at (x_0, y_0)**
- ▶ Relative minimum at (x_0, y_0)
- ▶ Saddle point at (x_0, y_0)
- ▶ No conclusion can be drawn.

Question No: 13 (Marks: 1) - Please choose one

Let the function $f(x, y)$ has continuous second-order partial derivatives $(f_{xx}, f_{yy}$ and $f_{xy})$ in some circle centered at a critical point (x_0, y_0) and let $D = f_{xx}(x_0, y_0) f_{yy}(x_0, y_0) - f_{xy}^2(x_0, y_0)$

If $D = 0$ then -----

- ▶ f has relative maximum at (x_0, y_0)
- ▶ f has relative minimum at (x_0, y_0)
- ▶ f has saddle point at (x_0, y_0)
- ▶ **No conclusion can be drawn.**

Question No: 14 (Marks: 1) - Please choose one

The function $f(x, y) = \sqrt{y-x}$ is continuous in the region ----- and discontinuous elsewhere.

- ▶ $x \neq y$
- ▶ $x \leq y$
- ▶ $x > y$

Question No: 15 (Marks: 1) - Please choose one

Plane is an example of -----

- ▶ Curve
- ▶ **Surface**
- ▶ Sphere
- ▶ Cone

Question No: 16 (Marks: 1) - Please choose one

If $R = R_1 \cup R_2$, where R_1 and R_2 are no overlapping regions then

$$\iint_{R_1} f(x, y) dA + \iint_{R_2} f(x, y) dA =$$

- ▶ $\iint_R f(x, y) dA$
- ▶ $\iint_{R_1} f(x, y) dA \cup \iint_{R_2} f(x, y) dA$
- ▶ $\iint_R f(x, y) dV$
- ▶ $\iint_{R_1} f(x, y) dA \cap \iint_{R_2} f(x, y) dA$
- ▶

Question No: 17 (Marks: 1) - Please choose one

If $R = \{(x, y) / 0 \leq x \leq 2 \text{ and } 1 \leq y \leq 4\}$, then

$$\iint_R (6x^2 + 4xy^3) dA =$$

▶ $\int_1^4 \int_0^2 (6x^2 + 4xy^3) dy dx$

▶ $\int_0^2 \int_1^4 (6x^2 + 4xy^3) dx dy$

▶ $\int_1^4 \int_0^2 (6x^2 + 4xy^3) dx dy$

▶ $\int_2^4 \int_0^1 (6x^2 + 4xy^3) dx dy$

Question No: 18 (Marks: 1) - Please choose one

If $R = \{(x, y) / 0 \leq x \leq 2 \text{ and } -1 \leq y \leq 1\}$, then

$$\iint_R (x + 2y^2) dA =$$

▶ $\int_{-1}^1 \int_0^2 (x + 2y^2) dy dx$

▶ $\int_0^2 \int_1^{-1} (x + 2y^2) dx dy$

▶ $\int_{-1}^1 \int_0^2 (x + 2y^2) dx dy$

$$\int_1^2 \int_{-1}^0 (x+2y^2) dx dy$$



Question No: 19 (Marks: 1) - Please choose one

If $R = \{(x, y) / 0 \leq x \leq 2 \text{ and } 0 \leq y \leq 3\}$, then

$$\iint_R (1 - ye^{xy}) dA =$$

$$\int_0^2 \int_0^3 (1 - ye^{xy}) dy dx$$



$$\int_0^2 \int_0^3 (1 - ye^{xy}) dx dy$$



$$\int_2^3 \int_0^0 (1 - ye^{xy}) dx dy$$



$$\int_0^2 \int_2^3 (4xe^{2y}) dy dx$$



Question No: 20 (Marks: 1) - Please choose one

If $R = \{(x, y) / 0 \leq x \leq 4 \text{ and } 0 \leq y \leq 9\}$, then

$$\iint_R (3x - 4x\sqrt{xy}) dA =$$

$$\int_0^9 \int_0^4 (3x - 4x\sqrt{xy}) dy dx$$



$$\int_0^4 \int_0^9 (3x - 4x\sqrt{xy}) dx dy$$



$$\int_4^9 \int_0^{\sqrt{xy}} (3x - 4x\sqrt{xy}) dx dy$$



$$\int_0^4 \int_0^9 (3x - 4x\sqrt{xy}) dy dx$$



Question No: 21 (Marks: 2)

Evaluate the following double integral.

$$\iint (2xy + y^3) dx dy$$

Question No: 22 (Marks: 2)

Let $f(x, y) = 2 + x^2 + \frac{y^2}{4}$

Find the gradient of f

Question No: 23 (Marks: 3)

Evaluate the following double integral.

$$\iint (3 + 2x - 3y^2) dx dy$$

Question No: 24 (Marks: 3)

Let $f(x, y, z) = yz^3 - 2x^2$

Find the gradient of f .

Question No: 25 (Marks: 5)

Find Equation of a Tangent plane to the surface $f(x, y, z) = x^2 + 3y + z^3 - 9$ at the point $(2, -1, 2)$

Question No: 26 (Marks: 5)

Evaluate the iterated integral

$$\int_2^4 \int_{\frac{x}{2}}^{\sqrt{x}} (xy) \, dy \, dx$$



ASSALAM O ALAIKUM

All Dear fellows

ALL IN ONE MTH301 Calculus II

Midterm solved papers

Created BY Ali Shah

From Sahiwal

BSCS 4th semester

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Remember me in your prayers

MIDTERM EXAMINATION

Spring 2010

MTH301- Calculus II (Session - 3)

1. Every real number corresponds to _____ on the co-ordinate line.

➤ **Infinite number of points**

- Two points (one positive and one negative)
- A unique point
- None of these

2. There is one-to-one correspondence between the set of points on co-ordinate line and _____.

- Set of real numbers
- Set of integers
- **Set of natural numbers**
- Set of rational numbers

3. Which of the following is associated to each point of three dimensional space?

- A real number
- An ordered pair
- An ordered triple
- **A natural Number**

4. All axes are positive in _____ octant.

- **First**
- Second
- Fourth
- Eighth

5. The spherical co-ordinates of a point are $\left(\sqrt{3}, \frac{\pi}{3}, \frac{\pi}{2}\right)$. What are its cylindrical co-ordinates?

- $\left(\frac{\sqrt{3}}{2}, \frac{3}{2}, 0\right)$
- $\left(\sqrt{3} \cos \frac{\pi}{3}, \sqrt{3} \sin \frac{\pi}{3}, 0\right)$
- **$\left(\sqrt{3} \sin \frac{\pi}{3}, \frac{\pi}{2}, \sqrt{3} \cos \frac{\pi}{3}\right)$**
- $\left(\sqrt{3}, \frac{\pi}{3}, 0\right)$

6. Suppose $f(x, y) = xy - 2y^2$ where $x = t^3$ and $y = t$. Which one of the following is true?

- **$\frac{df}{dt} = -4t + 2$**
- $\frac{df}{dt} = -16t - t$
- $\frac{df}{dt} = 18t + 2$
- $\frac{df}{dt} = -10t^2 + 8t + 1$

7. Let $w = f(x, y, z)$ and $x = g(r, s)$, $y = h(r, s)$, $z = t(r, s)$ then by chain rule $\frac{\partial w}{\partial r} =$

- $\frac{\partial w}{\partial x} \frac{\partial x}{\partial r} + \frac{\partial w}{\partial y} \frac{\partial y}{\partial r} + \frac{\partial w}{\partial z} \frac{\partial z}{\partial r}$

- $\frac{\partial w}{\partial r} \frac{\partial x}{\partial r} + \frac{\partial w}{\partial r} \frac{\partial y}{\partial r} + \frac{\partial w}{\partial r} \frac{\partial z}{\partial r}$
- $\frac{\partial w}{\partial x} \frac{\partial x}{\partial r} \frac{\partial x}{\partial s} + \frac{\partial w}{\partial y} \frac{\partial y}{\partial r} \frac{\partial y}{\partial s} + \frac{\partial w}{\partial z} \frac{\partial z}{\partial r} \frac{\partial z}{\partial s}$
- $\frac{\partial w}{\partial r} \frac{\partial r}{\partial x} + \frac{\partial w}{\partial r} \frac{\partial r}{\partial y} + \frac{\partial w}{\partial r} \frac{\partial r}{\partial z}$

8. Magnitude of vector \vec{a} is 2, magnitude of vector \vec{b} is 3 and angle between them when placed tail to tail is 45 degrees. What is $\vec{a} \cdot \vec{b}$?

- 4.5
- **6.2**
- 5.1
- 4.2

9. Is the function $f(x, y)$ continuous at origin? If not, why? $f(x, y) = \begin{cases} 0 & \text{if } x \geq 0 \text{ and } y \geq 0 \\ 1 & \text{otherwise} \end{cases}$

- $f(x, y)$ is continuous at origin
- **$f(0, 0)$ is not defined**
- $f(0, 0)$ is defined but $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$ does not exist
- $f(0, 0)$ is defined and $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$ exist but these two numbers are not equal.

10. Is the function $f(x, y)$ continuous at origin? If not, Why? $f(x, y) = \begin{cases} \frac{3x^2y}{x^2+y^2} & \text{if } (x, y) \neq 0 \\ 0 & \text{if } (x, y) = 0 \end{cases}$

- $f(x, y)$ is continuous at origin
- **$f(0, 0)$ is not defined**
- $f(0, 0)$ is defined but $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$ does not exist
- $f(0, 0)$ is defined and $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$ exist but these two numbers are not equal.

11. Let R be a closed region in two dimensional space. What does the double integral over R calculates?

- Area of R
- **Radius of inscribed circle in R.**
- Distance between two endpoints of R.
- None of these

12. Which of the following formula can be used to find the volume of a parallelepiped with adjacent edges formed by the vectors \vec{a} , \vec{b} and \vec{c} ?

- $|\vec{a} \times (\vec{b} \times \vec{c})|$
- $|\vec{a} \cdot (\vec{b} \cdot \vec{c})|$
- $|\vec{a} \cdot (\vec{b} \times \vec{c})|$
- $|\vec{a} \times (\vec{b} \cdot \vec{c})|$

13. Two surfaces are said to be orthogonal at a point of their intersection if their normals at that point are _____.

- Parallel
- Perpendicular
- In opposite direction
- Same direction

14. By Extreme Value Theorem, if a function $f(x, y)$ is continuous on a closed and bounded set R , then $f(x, y)$ has both _____ on R .

- Absolute maximum and absolute minimum value
- Relative maximum and relative minimum value
- Absolute maximum and relative minimum value
- Relative maximum and absolute minimum value

15. Let the function $f(x, y)$ has continuous second-order partial derivatives (f_{xx} , f_{yy} and f_{xy}) in some circle centered at a critical point (x_0, y_0) and let $D = f_{xx}(x_0, y_0) f_{yy}(x_0, y_0) - f_{xy}^2(x_0, y_0)$ if $D > 0$ and $f_{xx}(x_0, y_0) < 0$ then f has _____.

- Relative maximum at (x_0, y_0)
- Relative minimum at (x_0, y_0)
- Saddle point at (x_0, y_0)
- No conclusion can be drawn.

16. Let the function $f(x, y)$ has continuous second-order partial derivatives (f_{xx} , f_{yy} and f_{xy}) in some circle centered at a critical point (x_0, y_0) and let $D = f_{xx}(x_0, y_0) f_{yy}(x_0, y_0) - f_{xy}^2(x_0, y_0)$ if $D = 0$ then _____.

➤ f has relative maximum at (x_0, y_0)

➤ f has relative minimum at (x_0, y_0)

➤ f has saddle point at (x_0, y_0)

➤ No conclusion can be drawn.

17. If $R = R_1 \cup R_2$ where R_1 and R_2 are non overlapping regions then

$$\iint_{R_1} f(x, y) dA + \iint_{R_2} f(x, y) dA =$$

➤ $\iint_R f(x, y) dA$

➤ $\iint_{R_1} f(x, y) dA \cup \iint_{R_2} f(x, y) dA$

➤ $\iint_R f(x, y) dV$

➤ $\iint_R f(x, y) dV \cap \iint_{R_2} f(x, y) dA$

18. If $R = \{(x, y) \mid 1 \leq x \leq 2 \text{ and } 0 \leq y \leq 4\}$ then $\iint_R (6x^2 + 4xy^3) dA =$

➤ $\int_1^2 \int_0^4 (6x^2 + 4xy^3) dy dx$

➤ $\int_0^1 \int_2^4 (6x^2 + 4xy^3) dy dx$

➤ $\int_1^2 \int_0^4 (6x^2 + 4xy^3) dy dx$

➤ $\int_2^4 \int_0^1 (6x^2 + 4xy^3) dy dx$

19. If $R = \{(x, y) \mid 0 \leq x \leq 1 \text{ and } 2 \leq y \leq 4\}$ then $\iint_R (4xe^{2y}) dA =$

➤ $\int_0^1 \int_2^4 (4xe^{2y}) dy dx$

$$\triangleright \int_0^1 \int_2^4 (4xe^{2y}) dx dy$$

$$\triangleright \int_1^4 \int_0^2 (4xe^{2y}) dx dy$$

$$\triangleright \int_1^4 \int_0^2 (4xe^{2y}) dy dx$$

20. If $R = \{(x, y) \mid 0 \leq x \leq 4 \text{ and } 0 \leq y \leq 9\}$ then $\iint_R (3x - 4x\sqrt{xy}) dA =$

$$\triangleright \int_0^9 \int_0^4 (3x - 4x\sqrt{xy}) dy dx$$

$$\triangleright \int_0^9 \int_0^4 (3x - 4x\sqrt{xy}) dx dy$$

$$\triangleright \int_4^9 \int_0^4 (3x - 4x\sqrt{xy}) dx dy$$

$$\triangleright \int_0^4 \int_0^9 (3x - 4x\sqrt{xy}) dy dx$$

21. Suppose that the surface $f(x, y, z)$ has continuous partial derivatives at the point (a, b, c) . Write down the equation of tangent plane at this point.

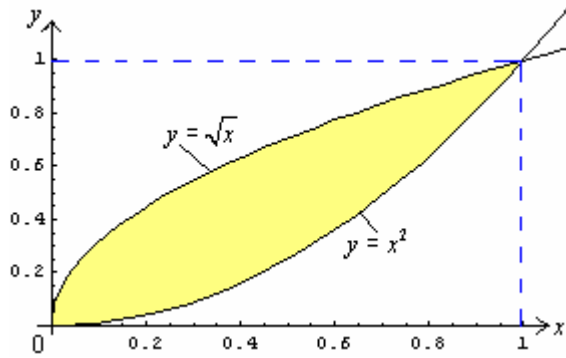
22. Evaluate the following double integral $\int \int (12xy^2 - 8x^3) dy dx$.

23. Evaluate the following double integral $\int \int (3 + 2x - 3y^2) dx dy$

24. Let $f(x, y, z) = xy^2e^z$. Find the gradient of f .

25. Find, Equation of Tangent plane to the surface $f(x, y, z) = x^2 + y^2 + z - 9$ at the point $(1, 2, 4)$.

26. Use the double integral in rectangular co-ordinates to compute area of the region bounded by the curves $y = x^2$ and $y = \sqrt{x}$.



MIDTERM EXAMINATION

Fall 2009

MTH301- Calculus II

Question No: 1 (Marks: 1) - Please choose one

_____ Let x
be any point on co-ordinate line. What does the inequality $-3 < x < 1$ means?

- a. The set of all integers between -3 and 1
- b. The set of all natural numbers between -3 and 1.
- c. The set of all rational numbers between -3 and 1

d. The set of all real numbers between -3 and 1

Question No: 2 (Marks: 1) - Please choose one

_____ Which of the following number is associated to each point on a co-ordinate line?

▶ An integer

▶ **A real number**

▶ A rational number

- ▶ A natural number

Question No: 3 (Marks: 1) - Please choose one

Which of the following set is the union of set of all rational and irrational numbers?

- ▶ Set of rational numbers
- ▶ Set of integers
- ▶ **Set of real numbers**
- ▶ Empty set.

Question No: 4 (Marks: 1) - Please choose one

π is an example of -----

- ▶ **Irrational numbers**
- ▶ Rational numbers
- ▶ Integers
- ▶ Natural numbers

Question No: 5 (Marks: 1) - Please choose one

Which of the following is associated to each point on a plane?

- ▶ A real number
- ▶ A natural number

- ▶ An ordered pair
- ▶ An ordered triple

Question No: 6 (Marks: 1) - Please choose one

----- planes intersect at right angle to form three dimensional space.

Three

Four

Eight

Twelve

Question No: 7 (Marks: 1) - Please choose one

----- At
each point of domain, the function -----

Is defined

Is continuous

Is infinite

Has a limit

Question No: 8 (Marks: 1) - Please choose one

What is the general equation of parabola whose axis of symmetry is parallel to y-axis?

$$y = ax^2 + b \quad (a \neq 0)$$

$$x = ay^2 + b \quad (a \neq 0)$$

$$y = ax^2 + bx + c \quad (a \neq 0)$$

$$x = ay^2 + by + c \quad (a \neq 0)$$

<http://vustudents.ning.com>

Question No: 9 (Marks: 1) - Please choose one

_____ The spherical co-ordinates (ρ, θ, ϕ) , of a point are $\left(2, \frac{\pi}{4}, 0\right)$. What are the rectangular co-ordinates of this point?

$$(0, 0, \sqrt{2})$$

$$(2, 0, 0)$$

$$(0, 0, 2)$$

$$(\sqrt{2}, 0, \sqrt{2})$$

Question No: 10 (Marks: 1) - Please choose one

_____ Let $f(x, y) = y^2 x^4 e^x + 2$.

$$\frac{\partial^5 f}{\partial y^3 \partial x^2}$$

Which method is best suited for evaluation of _____ ?

Normal method of finding the higher order mixed partial derivatives

Chain Rule

Laplacian Method

Euler's method for mixed partial derivative**Question No: 11 (Marks: 1) - Please choose one**

Suppose $f(x, y) = x^3 e^{xy}$. Which one of the following is correct?

$$\frac{\partial f}{\partial x} = 3x^2 e^{xy} + x^3 y e^{xy}$$

$$\frac{\partial f}{\partial x} = 3x^2 e^{xy} + x^4 e^{xy}$$

$$\frac{\partial f}{\partial x} = 3x^2 e^{xy}$$

$$\frac{\partial f}{\partial x} = 3x^2 y e^{xy}$$

Question No: 12 (Marks: 1) - Please choose one

Suppose $f(x, y) = x^3 e^{xy}$. Which one of the statements is correct?

$$\frac{\partial f}{\partial y} = 3x^3 e^{xy}$$

$$\frac{\partial f}{\partial y} = x^3 e^{xy}$$

$$\frac{\partial f}{\partial y} = x^4 e^{xy}$$

$$\frac{\partial f}{\partial y} = x^3 y e^{xy}$$

Question No: 13 (Marks: 1) - Please choose one

Suppose $f(x, y) = 2xy$ where $x = t^2 + 1$ and $y = 3 - t$. Which one of the following is true?

$$\frac{df}{dt} = 6t - 4t^2 - 2$$

$$\frac{df}{dt} = 6t - 2$$

$$\frac{df}{dt} = 4t^3 + 6t - 6$$

$$\frac{df}{dt} = -6t^2 + 12t - 2$$

Question No: 14 (Marks: 1) - Please choose one

Let i, j and k be unit vectors in the direction of x-axis, y-axis and z-axis respectively. Suppose that $\vec{a} = 2i + 5j - k$. What is the magnitude of vector \vec{a} ? <http://vustudents.ning.com>

6

30

$$\frac{\sqrt{30}}{\sqrt{28}}$$

Question No: 15 (Marks: 1) - Please choose one

_____ Is
the function $f(x, y)$ continuous at origin? If not, why?

$$f(x, y) = \frac{xy}{x^2 + y^2}$$

$f(x, y)$ is continuous at origin

$$\lim_{(x,y) \rightarrow (0,0)} f(x, y) \text{ does not exist}$$

$f(0, 0)$ is defined and $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$ exists but these two numbers are not equal.

Question No: 16 (Marks: 1) - Please choose one

_____ Let
R be a closed region in two dimensional space. What does the double integral over R calculates?

Area of R.

Radius of inscribed circle in R.

Distance between two endpoints of R.

None of these

Question No: 17 (Marks: 1) - Please choose one

_____ What is the relation between the direction of gradient at any point on the surface to the tangent plane at that point ?

parallel

perpendicular

opposite direction

No relation between them.

Question No: 18 (Marks: 1) - Please choose one

Two surfaces are said to intersect orthogonally if their normals at every point common to them are -----

perpendicular

parallel

in opposite direction

<http://vustudents.ning.com>

Question No: 19 (Marks: 1) - Please choose one

Let the function $f(x, y)$ has continuous second-order partial derivatives $(f_{xx}, f_{yy} \text{ and } f_{xy})$ in some circle centered at a critical point (x_0, y_0) and let $D = f_{xx}(x_0, y_0) f_{yy}(x_0, y_0) - f_{xy}^2(x_0, y_0)$

If $D > 0$ and $f_{xx}(x_0, y_0) < 0$ then f has -----

Relative maximum at (x_0, y_0)

Relative minimum at (x_0, y_0)

Saddle point at (x_0, y_0)

No conclusion can be drawn.

Question No: 20 (Marks: 1) - Please choose one

Which of the following are direction ratios for the line joining the points $(1, 3, 5)$ and $(2, -1, 4)$?

3, 2 and 9

1, -4 and -1

2, -3 and 20

0.5, -3 and $5/4$

Question No: 21 (Marks: 1) - Please choose one

$R = R_1 \cup R_2$, where R_1 and R_2 are no overlapping regions then

$$\iint_{R_1} f(x, y) dA + \iint_{R_2} f(x, y) dA =$$

$\iint_R f(x, y) dA$

$$\iint_{R_1} f(x, y) dA \cup \iint_{R_2} f(x, y) dA$$

$$\iint_R f(x, y) dV$$

$$\iint_{R_1} f(x,y)dA \cap \iint_{R_2} f(x,y)dA$$

Question No: 22 (Marks: 1) - Please choose one

If $R = \{(x, y) / 2 \leq x \leq 4 \text{ and } 0 \leq y \leq 1\}$, then

$$\iint_R (4xe^{2y})dA =$$

$$\int_0^1 \int_2^4 (4xe^{2y})dydx$$

$$\int_0^1 \int_2^4 (4xe^{2y})dx dy$$

$$\int_1^4 \int_0^2 (4xe^{2y})dx dy$$

$$\int_1^4 \int_0^2 (4xe^{2y})dy dx$$

Question No: 23 (Marks: 1) - Please choose one <http://vustudents.ning.com>

If $R = \{(x, y) / 0 \leq x \leq 2 \text{ and } 0 \leq y \leq 3\}$, then

$$\iint_R (1 - ye^{xy}) dA =$$

$$\int_0^2 \int_0^3 (1 - ye^{xy}) dy dx$$

$$\int_0^2 \int_0^3 (1 - ye^{xy}) dx dy$$

$$\int_2^3 \int_0^0 (1 - ye^{xy}) dx dy$$

$$\int_0^2 \int_2^3 (4xe^{2y}) dy dx$$

Question No: 24 (Marks: 1) - Please choose one

Which of the following is geometrical representation of the equation $y = x^2$, in three dimensional space?

Parabola

Straight line

Half cylinder

Cone

Question No: 25 (Marks: 3)

$$\left(\sqrt{3}, \frac{\pi}{3}, \frac{\pi}{2} \right)$$

Consider the point in spherical coordinate system. Find the rectangular coordinates of this point.

<http://vustudents.ning.com>

Question No: 26 (Marks: 5)

Consider a function $f(x, y) = 4xy - x^4 - y^4$. One of its critical point is $(1, 1)$. Find whether $(1, 1)$ is relative maxima, relative minima or saddle point of $f(x, y)$.

Question No: 27 (Marks: 10)

Directional derivative of the function, $f(x, y) = x^2y - 4y^3$, at the point $(2, 1)$ in the direction of vector, Find
 $\vec{u} = \frac{\sqrt{3}}{2}i + \frac{1}{2}j$

MIDTERM EXAMINATION**Spring 2010****MTH301- Calculus II**

Question No: 1 (Marks: 1) - Please choose one

Which of the following is the interval notation of real line?

$(-\infty, +\infty)$

$(-\infty, 0)$

$(0, +\infty)$

Question No: 2 (Marks: 1) - Please choose one

What is the general equation of parabola whose axis of symmetry is parallel to y-axis?

$y = ax^2 + b \quad (a \neq 0)$

$x = ay^2 + b \quad (a \neq 0)$

$y = ax^2 + bx + c \quad (a \neq 0)$

$x = ay^2 + by + c \quad (a \neq 0)$

<http://vustudents.ning.com>

Question No: 3 (Marks: 1) - Please choose one

Which of the following is geometrical representation of the equation $y = 4$, in three dimensional space?

A point on y-axis

Plane parallel to xy-plane

Plane parallel to yz-axis

Plane parallel to xz-plane

Question No: 4 (Marks: 1) - Please choose one

Suppose $f(x, y) = x^3 e^{xy}$. Which one of the statements is correct?

▶ $\frac{\partial f}{\partial y} = 3x^3 e^{xy}$

▶ $\frac{\partial f}{\partial y} = x^3 e^{xy}$

▶ $\frac{\partial f}{\partial y} = x^4 e^{xy}$

▶ $\frac{\partial f}{\partial y} = x^3 y e^{xy}$

Question No: 5 (Marks: 1) - Please choose one

$f(x, y) = x^2 y - y^3 + \ln x$

then $\frac{\partial^2 f}{\partial x^2} =$

▶ $2xy + \frac{1}{x^2}$

▶ $2y + \frac{1}{x^2}$

▶ $2xy - \frac{1}{x^2}$

$$2y - \frac{1}{x^2}$$

Question No: 6 (Marks: 1) - Please choose one

_____ Let
 $w = f(x, y, z)$ and $x = g(r, s)$, $y = h(r, s)$, $z = t(r, s)$ then by chain rule

$$\frac{\partial w}{\partial r} =$$

$$\frac{\partial w}{\partial x} \frac{\partial x}{\partial r} + \frac{\partial w}{\partial y} \frac{\partial y}{\partial r} + \frac{\partial w}{\partial z} \frac{\partial z}{\partial r}$$

$$\frac{\partial w}{\partial r} \frac{\partial x}{\partial r} + \frac{\partial w}{\partial r} \frac{\partial y}{\partial r} + \frac{\partial w}{\partial r} \frac{\partial z}{\partial r}$$

$$\frac{\partial w}{\partial x} \frac{\partial x}{\partial r} \frac{\partial x}{\partial s} + \frac{\partial w}{\partial y} \frac{\partial y}{\partial r} \frac{\partial y}{\partial s} + \frac{\partial w}{\partial z} \frac{\partial z}{\partial r} \frac{\partial z}{\partial s}$$

$$\frac{\partial w}{\partial r} \frac{\partial r}{\partial x} + \frac{\partial w}{\partial r} \frac{\partial r}{\partial y} + \frac{\partial w}{\partial r} \frac{\partial r}{\partial z}$$

Question No: 7 (Marks: 1) - Please choose one

_____ Is
 the function $f(x, y)$ continuous at origin? If not, why?

$$f(x, y) = \begin{cases} \frac{3x^2y}{x^2 + y^2} & \text{if } (x, y) \neq 0 \\ 0 & \text{if } (x, y) = 0 \end{cases}$$

▶ $f(x, y)$ is continuous at origin

▶ $f(0, 0)$ is not defined

▶ $f(0, 0)$ is defined but $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$ does not exist

▶ $f(0, 0)$ is defined and $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$ exists but these two numbers are not equal.

Question No: 8 (Marks: 1) - Please choose one

_____ Let R be a closed region in two dimensional space. What does the double integral over R calculates?

- ▶ Area of R.
- ▶ Radius of inscribed circle in R.
- ▶ Distance between two endpoints of R.

▶ **None of these (not sure)**

<http://vustudents.ning.com>

Question No: 9 (Marks: 1) - Please choose one

_____ Two surfaces are said to be orthogonal at a point of their intersection if their normals at that point are -----

- ▶ Parallel
- ▶ **Perpendicular**
- ▶ In opposite direction

Question No: 10 (Marks: 1) - Please choose one

Two surfaces are said to intersect orthogonally if their normals at every point common to them are -----

- ▶ **perpendicular**
- ▶ parallel
- ▶ in opposite direction

Question No: 11 (Marks: 1) - Please choose one

Let the function $f(x, y)$ has continuous second-order partial derivatives $(f_{xx}, f_{yy}$ and $f_{xy})$ in some circle centered at a critical point (x_0, y_0) and let $D = f_{xx}(x_0, y_0) f_{yy}(x_0, y_0) - f_{xy}^2(x_0, y_0)$

If $D > 0$ and $f_{xx}(x_0, y_0) > 0$ then f has -----

- ▶ Relative maximum at (x_0, y_0)
- ▶ **Relative minimum at (x_0, y_0)**
- ▶ Saddle point at (x_0, y_0)
- ▶ No conclusion can be drawn. <http://vustudents.ning.com>

Question No: 12 (Marks: 1) - Please choose one

Let the function $f(x, y)$ has continuous second-order partial derivatives $(f_{xx}, f_{yy}$ and $f_{xy})$ in some circle centered at a critical point (x_0, y_0) and let $D = f_{xx}(x_0, y_0) f_{yy}(x_0, y_0) - f_{xy}^2(x_0, y_0)$

If $D > 0$ and $f_{xx}(x_0, y_0) < 0$ then f has -----

▶ **Relative maximum at (x_0, y_0)**

▶ Relative minimum at (x_0, y_0)

▶ Saddle point at (x_0, y_0)

▶ No conclusion can be drawn.

Question No: 13 (Marks: 1) - Please choose one

----- Let

the function $f(x, y)$ has continuous second-order partial derivatives $(f_{xx}, f_{yy}$ and $f_{xy})$ in some circle centered at a critical point (x_0, y_0) and let

$$D = f_{xx}(x_0, y_0) f_{yy}(x_0, y_0) - f_{xy}^2(x_0, y_0)$$

If $D < 0$ then f has -----

▶ Relative maximum at (x_0, y_0)

▶ Relative minimum at (x_0, y_0)

▶ **Saddle point at (x_0, y_0)**

▶ No conclusion can be drawn

Question No: 14 (Marks: 1) - Please choose one

----- Let

(x_1, y_1, z_1) and (x_2, y_2, z_2) be any two points in three dimensional space. What does the

formula $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$ calculates?

▶ Distance between these two points

- ▶ Midpoint of the line joining these two points
- ▶ Ratio between these two points

Question No: 15 (Marks: 1) - Please choose one

The function $f(x, y) = \sqrt{y-x}$ is continuous in the region ----- and discontinuous elsewhere.

▶ $x \neq y$

▶ $x \leq y$

▶ $x > y$ <http://vustudents.ning.com>

Question No: 16 (Marks: 1) - Please choose one

Plane is an example of -----

▶ Curve

▶ Surface

▶ Sphere

▶ Cone

Question No: 17 (Marks: 1) - Please choose one

If $R = R_1 \cup R_2$, where R_1 and R_2 are no overlapping regions then

$$\iint_{R_1} f(x,y)dA + \iint_{R_2} f(x,y)dA =$$

$$\iint_R f(x,y)dA$$

$$\iint_{R_1} f(x,y)dA \cup \iint_{R_2} f(x,y)dA$$

$$\iint_R f(x,y)dV$$

$$\iint_{R_1} f(x,y)dA \cap \iint_{R_2} f(x,y)dA$$

<http://vustudents.ning.com>

Question No: 18 (Marks: 1) - Please choose one

If $R = \{(x, y) / 0 \leq x \leq 2 \text{ and } 1 \leq y \leq 4\}$, then

$$\iint_R (6x^2 + 4xy^3)dA =$$

$$\int_1^4 \int_0^2 (6x^2 + 4xy^3)dydx$$

$$\int_0^2 \int_1^4 (6x^2 + 4xy^3) dx dy$$



$$\int_1^4 \int_0^2 (6x^2 + 4xy^3) dx dy$$



$$\int_2^4 \int_0^1 (6x^2 + 4xy^3) dx dy$$



Question No: 19 (Marks: 1) - Please choose one

If $R = \{(x, y) / 0 \leq x \leq 2 \text{ and } 0 \leq y \leq 3\}$, then

$$\iint_R (1 - ye^{xy}) dA =$$

$$\int_0^2 \int_0^3 (1 - ye^{xy}) dy dx$$



$$\int_0^2 \int_0^3 (1 - ye^{xy}) dx dy$$



$$\int_2^3 \int_0^1 (1 - ye^{xy}) dx dy$$



$$\int_0^2 \int_2^3 (4xe^{2y}) dy dx$$



Question No: 20 (Marks: 1) - Please choose one

If $R = \{(x, y) / 0 \leq x \leq 4 \text{ and } 0 \leq y \leq 9\}$, then

$$\iint_R (3x - 4x\sqrt{xy}) dA =$$

<http://vustudents.ning.com>

$$\int_0^9 \int_0^4 (3x - 4x\sqrt{xy}) dy dx$$



$$\int_0^4 \int_4^9 (3x - 4x\sqrt{xy}) dx dy$$



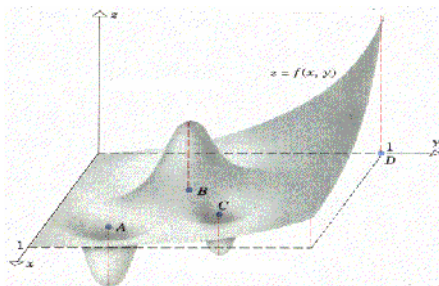
$$\int_4^9 \int_0^4 (3x - 4x\sqrt{xy}) dx dy$$



$$\int_0^4 \int_0^9 (3x - 4x\sqrt{xy}) dy dx$$

**Question No: 21 (Marks: 2)**

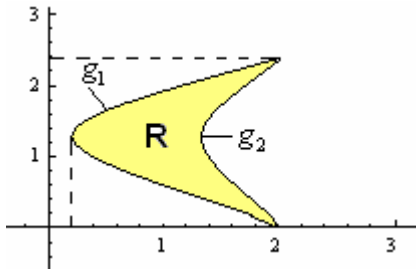
Following is the graph of a function of two variables



In its whole domain, state whether the function has relative maximum value or absolute maximum value at point B. Also, justify your answer

Question No: 22 (Marks: 2)

Let the function $f(x, y)$ is continuous in the region R, where R is bounded by graph of functions g_1 and g_2 (as shown below). <http://vustudents.ning.com>



In the following equation, replace question mark (?) with the correct value.

$$\iint_R f(x, y) dA = \int_{?}^{?} \int_{?}^{?} f(x, y) \text{ _____?_____}$$

Question No: 23 (Marks: 3)

Evaluate the following double integral.

$$\iint (3 + 2x - 3y^2) dx dy$$

Question No: 24 (Marks: 3)

Let $f(x, y, z) = yz^3 - 2x^2$

Find the gradient of f .

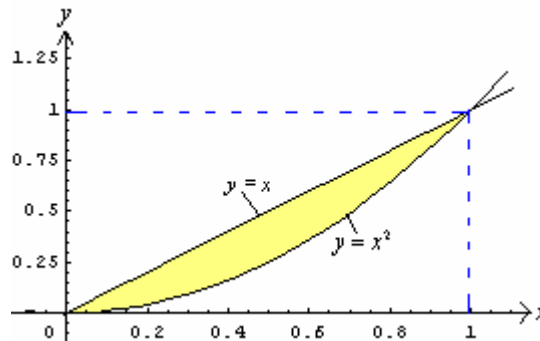
Question No: 25 (Marks: 5)

Find, Equation of Normal line (in parametric form) to the surface

$f(x, y, z) = xy + 2yz - xz^2 + 10$ at the point $(-5, 5, 1)$

Question No: 26 (Marks: 5)

Use double integral in rectangular co-ordinates to compute area of the region bounded by the curves $y = x$ and $y = x^2$, in the first quadrant.



MIDTERM EXAMINATION
Spring 2010
MTH301- Calculus II (Session - 3)

Question No: 1 (Marks: 1) - Please choose one

Which of the following number is associated to each point on a co-ordinate line?

An integer

A real number

A rational number

A natural number

Question No: 2 (Marks: 1) - Please choose one

If $a > 0$, then the parabola $y = ax^2 + bx + c$ opens in which of the following direction?

Positive x - direction

Negative x - direction

Positive y - direction

Negative y - direction

Question No: 3 (Marks: 1) - Please choose one

Rectangular co-ordinate of a point is $(1, \sqrt{3}, -2)$. What is its spherical co-ordinate?

$\left(2\sqrt{2}, \frac{\pi}{3}, \frac{3\pi}{2} \right)$



$$\left(2\sqrt{2}, \frac{\pi}{2}, \frac{3\pi}{4} \right)$$

▶

$$\left(2\sqrt{2}, \frac{\pi}{3}, \frac{3\pi}{4} \right)$$

▶

$$\left(\sqrt{2}, \frac{\pi}{3}, \frac{3\pi}{4} \right)$$

▶

Question No: 4 (Marks: 1) - Please choose one

If a function is not defined at some point, then its limit ----- exist at that point.

▶ Always

▶ Never

▶ May

Question No: 5 (Marks: 1) - Please choose one

Suppose $f(x, y) = x^3 e^{xy}$. Which one of the statements is correct?

$$\frac{\partial f}{\partial y} = 3x^3 e^{xy}$$

▶

$$\frac{\partial f}{\partial y} = x^3 e^{xy}$$

▶

$$\frac{\partial f}{\partial y} = x^4 e^{xy}$$

▶

$$\frac{\partial f}{\partial y} = x^3 y e^{xy}$$

▶

Question No: 6 (Marks: 1) - Please choose one

If $f(x, y) = x^2 y - y^3 + \ln x$

$$\frac{\partial^2 f}{\partial x^2}$$

then =

$$2xy + \frac{1}{x^2}$$

. ▶

$$2y + \frac{1}{x^2}$$

. ▶

$$2xy - \frac{1}{x^2}$$

. ▶

$$2y - \frac{1}{x^2}$$

. ▶

Question No: 7 (Marks: 1) - Please choose one

Suppose $f(x, y) = xy - 2y^2$ where $x = 3t + 1$ and $y = 2t$. Which one of the following is true?

$$\frac{df}{dt} = -4t + 2$$

. ▶

$$\frac{df}{dt} = -16t - t$$

. ▶

$$\frac{df}{dt} = 18t + 2$$

. ▶

$$\frac{df}{dt} = -10t^2 + 8t + 1$$

. ▶

Question No: 8 (Marks: 1) - Please choose one

Is the function $f(x, y)$ continuous at origin? If not, why?

$$f(x, y) = \begin{cases} 0 & \text{If } x \geq 0 \text{ and } y \geq 0 \\ 1 & \text{Otherwise} \end{cases}$$

$f(x, y)$ is continuous at origin

$f(0, 0)$ is not defined

$f(0, 0)$ is defined but $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$ does not exist

$f(0, 0)$ is defined and $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$ exists but these two numbers are not equal.

Question No: 9 (Marks: 1) - Please choose one

What is the relation between the direction of gradient at any point on the surface to the tangent plane at that point ?

parallel

perpendicular

opposite direction

No relation between them.

Question No: 10 (Marks: 1) - Please choose one

Two surfaces are said to intersect orthogonally if their normals at every point common to them are -----

perpendicular

parallel

in opposite direction

Question No: 11 (Marks: 1) - Please choose one

By Extreme Value Theorem, if a function $f(x, y)$ is continuous on a closed and bounded set R , then $f(x, y)$ has both ----- on R .

Absolute maximum and absolute minimum value

Relative maximum and relative minimum value

Question No: 12 (Marks: 1) - Please choose one

Let the function $f(x, y)$ has continuous second-order partial derivatives $(f_{xx}, f_{yy}$ and $f_{xy})$ in some circle centered at a critical point (x_0, y_0) and let $D = f_{xx}(x_0, y_0) f_{yy}(x_0, y_0) - f_{xy}^2(x_0, y_0)$

If $D > 0$ and $f_{xx}(x_0, y_0) < 0$ then f has -----

Relative maximum at (x_0, y_0) Relative minimum at (x_0, y_0) Saddle point at (x_0, y_0)

No conclusion can be drawn.

Question No: 13 (Marks: 1) - Please choose one

Let the function $f(x, y)$ has continuous second-order partial derivatives $(f_{xx}, f_{yy}$ and $f_{xy})$ in some circle centered at a critical point (x_0, y_0) and let $D = f_{xx}(x_0, y_0) f_{yy}(x_0, y_0) - f_{xy}^2(x_0, y_0)$

If $D = 0$ then -----

 f has relative maximum at (x_0, y_0) f has relative minimum at (x_0, y_0) f has saddle point at (x_0, y_0) **No conclusion can be drawn.****Question No: 14 (Marks: 1) - Please choose one**

The function $f(x, y) = \sqrt{y-x}$ is continuous in the region ----- and discontinuous elsewhere.

$$x \neq y$$

$$x \leq y$$

$$x > y$$

Question No: 15 (Marks: 1) - Please choose one

Plane is an example of -----

Curve

Surface

Sphere

Cone

Question No: 16 (Marks: 1) - Please choose one

If $R = R_1 \cup R_2$, where R_1 and R_2 are no overlapping regions then

$$\iint_{R_1} f(x, y) dA + \iint_{R_2} f(x, y) dA =$$

$$\iint_R f(x, y) dA$$

$$\iint_{R_1} f(x, y) dA \cup \iint_{R_2} f(x, y) dA$$

$$\iint_R f(x, y) dV$$

$$\iint_{R_1} f(x, y) dA \cap \iint_{R_2} f(x, y) dA$$

Question No: 17 (Marks: 1) - Please choose one

If $R = \{(x, y) / 0 \leq x \leq 2 \text{ and } 1 \leq y \leq 4\}$, then

$$\iint_R (6x^2 + 4xy^3) dA =$$

$$\int_1^4 \int_0^2 (6x^2 + 4xy^3) dy dx$$

$$\int_0^2 \int_1^4 (6x^2 + 4xy^3) dx dy$$

$$\int_1^4 \int_0^2 (6x^2 + 4xy^3) dx dy$$

$$\int_2^4 \int_0^1 (6x^2 + 4xy^3) dx dy$$

Question No: 18 (Marks: 1) - Please choose one

If $R = \{(x, y) / 0 \leq x \leq 2 \text{ and } -1 \leq y \leq 1\}$, then

$$\iint_R (x + 2y^2) dA =$$

$$\int_{-1}^1 \int_0^2 (x + 2y^2) dy dx$$

$$\int_0^2 \int_1^{-1} (x + 2y^2) dx dy$$

$$\int_{-1}^1 \int_0^2 (x + 2y^2) dx dy$$

$$\int_1^2 \int_{-1}^0 (x + 2y^2) dx dy$$

Question No: 19 (Marks: 1) - Please choose one

If $R = \{(x, y) / 0 \leq x \leq 2 \text{ and } 0 \leq y \leq 3\}$, then

$$\iint_R (1 - ye^{xy}) dA =$$

$$\int_0^2 \int_0^3 (1 - ye^{xy}) dy dx$$

$$\int_0^2 \int_0^3 (1 - ye^{xy}) dx dy$$

$$\int_2^3 \int_0^0 (1 - ye^{xy}) dx dy$$

$$\int_0^2 \int_2^3 (4xe^{2y}) dy dx$$

Question No: 20 (Marks: 1) - Please choose one

If $R = \{(x, y) / 0 \leq x \leq 4 \text{ and } 0 \leq y \leq 9\}$, then

$$\iint_R (3x - 4x\sqrt{xy}) dA =$$

$$\int_0^9 \int_0^4 (3x - 4x\sqrt{xy}) dy dx$$

$$\int_0^4 \int_4^9 (3x - 4x\sqrt{xy}) dx dy$$

$$\int_4^9 \int_0^4 (3x - 4x\sqrt{xy}) dx dy$$

$$\int_0^4 \int_0^9 (3x - 4x\sqrt{xy}) dy dx$$

Question No: 21 (Marks: 2)

Evaluate the following double integral.

$$\iint (2xy + y^3) dx dy$$

Question No: 22 (Marks: 2)

$$\text{Let } f(x, y) = 2 + x^2 + \frac{y^2}{4}$$

Find the gradient of f

Question No: 23 (Marks: 3)

Evaluate the following double integral.

$$\iint (3 + 2x - 3y^2) dx dy$$

Question No: 24 (Marks: 3)

Let $f(x, y, z) = yz^3 - 2x^2$

Find the gradient of f .

Question No: 25 (Marks: 5)

Find Equation of a Tangent plane to the surface $f(x, y, z) = x^2 + 3y + z^3 - 9$ at the point $(2, -1, 2)$

Question No: 26 (Marks: 5)

Evaluate the iterated integral

$$\int_2^4 \int_{\frac{x}{2}}^{\sqrt{x}} (xy) dy dx$$

MIDTERM EXAMINATION**MTH301**

Suppose $f(x, y) = x^3 e^{-xy}$. Which one of the following is correct?

$$\frac{\partial f}{\partial x} = 3x^2 e^{-xy} + x^3 y e^{-xy}$$

$$\frac{\partial f}{\partial x} = 3x^2 y e^{-xy}$$

$$\frac{\partial f}{\partial x} = 3x^2 e^{-xy} + x^4 e^{-xy}$$

$$\frac{\partial f}{\partial x} = 3x^2 e^{-xy}$$

Let R be a closed region in two dimensional space. What does the double integral over R calculates?

Area of R.

Radius of inscribed circle in R.

Distance between two endpoints of R.

None of these

What is the distance between points (3, 2, 4) and (6, 10, -1)?

$$7\sqrt{2}$$

$$2\sqrt{6}$$

$$\sqrt{34}$$

$$7\sqrt{3}$$

----- planes intersect at right angle to form three dimensional space.

Three

4

8

12

There is one-to-one correspondence between the set of points on co-ordinate line and -----

Set of real numbers

Set of integers

Set of natural numbers

Set of rational numbers

Let the function $f(x, y)$ has continuous second-order partial derivatives

$(f_{xx}, f_{yy}$ and $f_{xy})$ in some circle centered at a critical point (x_0, y_0) and let

$$D = f_{xx}(x_0, y_0) f_{yy}(x_0, y_0) - f_{xy}^2(x_0, y_0)$$

If $D = 0$ then -----

f has relative maximum at (x_0, y_0)

f has relative minimum at (x_0, y_0)

f has saddle point at (x_0, y_0)

No conclusion can be drawn.

If $R = \{(x, y) / 0 \leq x \leq 2 \text{ and } 0 \leq y \leq 3\}$, then

$$\iint_R (1 - ye^{xy}) dA =$$

$$\int_0^2 \int_0^3 (1 - ye^{xy}) dy dx$$

$$\int_0^2 \int_0^3 (1 - ye^{xy}) dx dy$$

$$\int_2^3 \int_0^0 (1 - ye^{xy}) dx dy$$

$$\int_0^2 \int_2^3 (4xe^{2y}) dy dx$$

Suppose $f(x, y) = 2xy$ where $x = t^2 + 1$ and $y = 3 - t$. Which one of the following is true?

$$\frac{df}{dt} = 6t - 4t^2 - 2$$

$$\frac{df}{dt} = 6t - 2$$

$$\frac{df}{dt} = 4t^3 + 6t - 6$$

$$\frac{df}{dt} = -6t^2 + 12t - 2$$

Let i , j and k be unit vectors in the direction of x-axis, y-axis and z-axis respectively. Suppose

that $\vec{a} = 2i + 5j - k$. What is the magnitude of vector \vec{a} ?

6

30

 $\sqrt{30}$ $\sqrt{28}$

A straight line is ----- geometric figure.

One-dimensional

Two-dimensional

Three-dimensional

Dimensionless

If $R = \{(x, y) / 0 \leq x \leq 2 \text{ and } 1 \leq y \leq 4\}$, then

$$\iint_R (6x^2 + 4xy^3) dA =$$

$$\int_1^4 \int_0^2 (6x^2 + 4xy^3) dy dx$$

$$\int_0^2 \int_1^4 (6x^2 + 4xy^3) dx dy$$

$$\int_1^4 \int_0^2 (6x^2 + 4xy^3) dx dy$$

$$\int_2^4 \int_0^1 (6x^2 + 4xy^3) dx dy$$

Which of the following formula can be used to find the Volume of a parallelepiped with adjacent edges formed by the vectors \vec{a} , \vec{b} and \vec{c} ?

$$\left| \vec{a} \times (\vec{b} \times \vec{c}) \right|$$

$$\left| \vec{a} \cdot (\vec{b} \cdot \vec{c}) \right|$$

$$\left| \vec{a} \cdot (\vec{b} \times \vec{c}) \right|$$

$$\left| \vec{a} \times (\vec{b} \cdot \vec{c}) \right|$$

The function $f(x, y) = \sqrt{y-x}$ is continuous in the region ----- and discontinuous elsewhere.

$$x \neq y$$

$$x \leq y$$

$$x > y$$

What is the relation between the direction of gradient at any point on the surface to the tangent plane at that point ?

parallel

perpendicular

opposite direction

No relation between them.

Suppose $f(x, y) = x^3 e^{xy}$. Which one of the statements is correct?

$$\frac{\partial f}{\partial y} = 3x^3 e^{xy}$$

$$\frac{\partial f}{\partial y} = x^3 e^{xy}$$

$$\frac{\partial f}{\partial y} = x^4 e^{xy}$$

$$\frac{\partial f}{\partial y} = x^3 y e^{xy}$$

Two surfaces are said to intersect orthogonally if their normals at every point common to them are -----

perpendicular

parallel

in opposite direction

Let the function $f(x, y)$ has continuous second-order partial derivatives $(f_{xx}, f_{yy}$ and $f_{xy})$ in some circle centered at a critical point (x_0, y_0) and let $D = f_{xx}(x_0, y_0) f_{yy}(x_0, y_0) - f_{xy}^2(x_0, y_0)$

If $D > 0$ and $f_{xx}(x_0, y_0) < 0$ then f has -----

Relative maximum at (x_0, y_0)

Relative minimum at (x_0, y_0)

Saddle point at (x_0, y_0)

No conclusion can be drawn.

If $R = \{(x, y) / 0 \leq x \leq 2 \text{ and } -1 \leq y \leq 1\}$, then

$$\iint_R (x + 2y^2) dA =$$

$$\int_{-1}^1 \int_0^2 (x + 2y^2) dy dx$$

$$\int_0^2 \int_1^{-1} (x + 2y^2) dx dy$$

$$\int_{-1}^1 \int_0^2 (x + 2y^2) dx dy$$

$$\int_1^2 \int_{-1}^0 (x + 2y^2) dx dy$$

$$f(x, y, z) = \frac{x^2 y}{z} + xyz$$

If

then what is the value of $f(1, 1, 1)$?

$$f(1, 1, 1) = 1$$

$$f(1, 1, 1) = 2$$

$$f(1, 1, 1) = 3$$

$$f(1, 1, 1) = 4$$

If $R = \{(x, y) / 0 \leq x \leq 4 \text{ and } 0 \leq y \leq 9\}$, then

$$\iint_R (3x - 4x\sqrt{xy}) dA =$$

$$\int_0^9 \int_0^4 (3x - 4x\sqrt{xy}) dy dx$$

$$\int_0^4 \int_4^9 (3x - 4x\sqrt{xy}) dx dy$$

$$\int_4^9 \int_4^0 (3x - 4x\sqrt{xy}) dx dy$$

$$\int_0^4 \int_0^9 (3x - 4x\sqrt{xy}) dy dx$$

$$\text{Let } f(x, y) = 2 + x^2 + \frac{y^2}{4}$$

Q- Find the gradient of f

2MARKS

Q - Let the function $f(x, y)$ is continuous in the region R , where R is a rectangle as shown below. complete the following equation

$$\iint_R f(x, y) dA = \int \int f(x, y) \text{ _____}$$

2MARKS

Q. Find all critical points of the function

$$f(x, y) = 4xy - x^3 - 2y^2$$

$$\int_1^4 \int_0^2 (6x^2 + 4xy^3) dx dy$$

Evaluate

Q-Evaluate the following double integral.

$$\iint (3+2x-3y^2) dx dy$$

3MARKS

$$y = \frac{1}{x^2}$$

Q- Let $y = \frac{1}{x^2}$. If x changes from 3 to 3.3, find the approximate change in the value of y using differential dy .

3MARKS

MIDTERM EXAMINATION

MTH301

That all is collected by removing the mistakes of the one paper file, hope it helpful...!

MTH301 Calculus II

Question No : 1 of 26

Marks: 1 (Budgeted Time 1 Min)

Every real number corresponds to on the co-ordinate line

Answer (Please select your correct option)

- Infinite number of points
- Two points (one positive and one negative)
- A unique point
- None of these

In that the answer is "unique point"

MTH301 Calculus II

Question No : 2 of 26 Marks: 1 (Budgeted Time 1 Min)

There is one-to-one correspondence between the set of points on co-ordinate line and -----

Answer (Please select your correct option)

- Set of real numbers
- Set of integers
- Set of natural numbers
- Set of rational numbers

In that the correct answer is the "Set of Real Numbers".

MTH301 Calculus II

Question No : 3 of 26 Marks: 1 (Budgeted Time 1 Min)

Which of the following is associated to each point of three dimensional space?

Answer (Please select your correct option)

- A real number
- An ordered pair
- An ordered triple
- A natural number

In this the exact answer is "an ordered triple".

MTH301 Calculus II

Question No : 4 of 26 Marks: 1 (Budgeted Time 1 Min)

All axes are positive in ----- octant.

Answer (Please select your correct option)

First

Second

Fourth

Eighth

It's right

MTH301 Calculus II

Question No : 5 of 26 Marks: 1 (Budgeted Time 1 Min)

The spherical co-ordinates of a point are $\left(\sqrt{3}, \frac{\pi}{3}, \frac{\pi}{2}\right)$. What are its cylindrical co-ordinates?

Answer (Please select your correct option)

$\left(\frac{\sqrt{3}}{2}, \frac{3}{2}, 0\right)$

$\left(\sqrt{3} \cos \frac{\pi}{3}, \sqrt{3} \sin \frac{\pi}{3}, 0\right)$

$\left(\sqrt{3} \sin \frac{\pi}{3}, \frac{\pi}{2}, \sqrt{3} \cos \frac{\pi}{3}\right)$

$\left(\sqrt{3}, \frac{\pi}{3}, 0\right)$

This one is also wrong as the answer is "4th one".because the central point of spherical is $\pi/3$ that should be same in cylindrical so, that's only occur in last one...

MTH301 Calculus II

Question No : 6 of 26

Marks: 1 (Budgeted Time 1 Min)

Suppose $f(x, y) = xy - 2y^2$ where $x = 3t + 1$ and $y = 2t$. Which one of the following is true?

$\frac{df}{dt} = -4t + 2$

$\frac{df}{dt} = -16t - t$

$\frac{df}{dt} = 18t + 2$

$\frac{df}{dt} = -10t^2 + 8t + 1$

That's right

MTH301 Calculus II

Question No : 7 of 26

Marks: 1 (Budgeted Time 1 Min)

Let $w = f(x, y, z)$ and $x = g(r, s)$, $y = h(r, s)$, $z = t(r, s)$ then by chain rule

$$\frac{\partial w}{\partial r} =$$

$\frac{\partial w}{\partial x} \frac{\partial x}{\partial r} + \frac{\partial w}{\partial y} \frac{\partial y}{\partial r} + \frac{\partial w}{\partial z} \frac{\partial z}{\partial r}$

$\frac{\partial w}{\partial r} \frac{\partial x}{\partial r} + \frac{\partial w}{\partial r} \frac{\partial y}{\partial r} + \frac{\partial w}{\partial r} \frac{\partial z}{\partial r}$

$\frac{\partial w}{\partial x} \frac{\partial x}{\partial r} + \frac{\partial w}{\partial y} \frac{\partial y}{\partial r} + \frac{\partial w}{\partial z} \frac{\partial z}{\partial r}$

$\frac{\partial w}{\partial r} \frac{\partial x}{\partial r} + \frac{\partial w}{\partial r} \frac{\partial y}{\partial r} + \frac{\partial w}{\partial r} \frac{\partial z}{\partial r}$

Here's answer is the "2nd" one...!

MTH301 Calculus II

Question No : 3 of 26 Marks: 1 (Budgeted Time 1 Min)

Magnitude of vector \vec{a} is 2, magnitude of vector \vec{b} is 3 and angle between them when placed tail to tail is 45 degrees. What is $\vec{a} \cdot \vec{b}$?

Answer (Please select your correct option)

4.5

6.2

5.1

4.2

That can't say exactly guys, its formula is following...!

$$a \cdot b = |a| |b| \cos \theta$$

θ = angle between the vectors

MTH301 Calculus II

Question No : 9 of 26 Marks: 1 (Budgeted Time 1 Min)

Is the function $f(x, y)$ continuous at origin? If not, why?

$$f(x, y) = \begin{cases} 0 & \text{if } x \geq 0 \text{ and } y \geq 0 \\ 1 & \text{Otherwise} \end{cases}$$

Answer (Please select your correct option)

$f(x, y)$ is continuous at origin

$f(0, 0)$ is not defined

$f(0, 0)$ is defined but $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$ does not exist

$f(0, 0)$ is defined and $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$ exists but these two numbers are not equal.

That's correct answer...!

MTH301 Calculus II

Question No : 10 of 26

Marks: 1 (Budgeted Time 1 Min)

Is the function $f(x, y)$ continuous at origin? If not, why?

$$f(x, y) = \begin{cases} \frac{3x^2y}{x^2+y^2} & \text{if } (x, y) \neq 0 \\ 0 & \text{if } (x, y) = 0 \end{cases}$$

Answer (Please select your correct option)

 $f(x, y)$ is continuous at origin

 $f(0, 0)$ is not defined

 $f(0, 0)$ is defined but $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$ does not exist

 $f(0, 0)$ is defined and $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$ exists but these two numbers are not equal.

But that's wrong the correct one is the 1st..

MTH301 Calculus II

Question No : 11 of 26

Marks: 1 (Budgeted Time 1 Min)

Let R be a closed region in two dimensional space. What does the double integral over R calculates?

 Area of R
 Radius of inscribed circle in R
 Distance between two endpoints of R .

 None of these

That's the first answer, as that was been define in the lecture 22...!

MTH301 Calculus II

Question No : 12 of 26 Marks: 1 (Budgeted Time 1 Min)

Which of the following formula can be used to find the Volume of a parallelepiped with adjacent edges formed by the vectors \vec{a} , \vec{b} and \vec{c} ?

Answer (Please select your correct option)

$|\vec{a} \times (\vec{b} \times \vec{c})|$

$|\vec{a} \cdot (\vec{b} \times \vec{c})|$

$|\vec{a} \cdot (\vec{b} \cdot \vec{c})|$

$|\vec{a} \times (\vec{b} \cdot \vec{c})|$

Here's the answer is the last one, you can check that on the start of lecture 11th, handout...!

MTH301 Calculus II

Question No : 13 of 26 Marks: 1 (Budgeted Time 1 Min)

Two surfaces are said to be orthogonal at a point of their intersection if their normals at that point are -----

Answer (Please select your correct option)

Parallel

Perpendicular

In opposite direction

Its answer is the "perpendicular"...!

MTH301 Calculus II

Question No : 14 of 26

Marks: 1 (Budgeted Time 1 Min)

By Extreme Value Theorem, if a function $f(x, y)$ is continuous on a closed and bounded set R , then $f(x, y)$ has both ----- on R .

Answer (Please select your correct option)

 Absolute maximum and absolute minimum value

 Relative maximum and relative minimum value

That's right answer...!

MTH301 Calculus II

Question No : 15 of 26

Marks: 1 (Budgeted Time 1 Min)

Let the function $f(x, y)$ has continuous second-order partial derivatives $(f_{xx}, f_{yy}$ and $f_{xy})$ in some circle centered at a critical point (x_0, y_0) and let $D = f_{xx}(x_0, y_0) f_{yy}(x_0, y_0) - f_{xy}^2(x_0, y_0)$

If $D > 0$ and $f_{xx}(x_0, y_0) < 0$ then f has -----

 Relative maximum at (x_0, y_0)
 Relative minimum at (x_0, y_0)
 Saddle point at (x_0, y_0)
 No conclusion can be drawn.

This is also right one..!

MTH301 Calculus II

Question No : 16 of 26 Marks: 1 (Budgeted Time 1 Min)

Let the function $f(x, y)$ has continuous second-order partial derivatives $(f_{xx}, f_{yy}$ and $f_{xy})$ in some circle centered at a critical point (x_0, y_0) and let $D = f_{xx}(x_0, y_0) f_{yy}(x_0, y_0) - f_{xy}^2(x_0, y_0)$

If $D = 0$ then

Answer (Please select your correct option)

f has relative maximum at (x_0, y_0)

f has relative minimum at (x_0, y_0)

f has saddle point at (x_0, y_0)

No conclusion can be drawn

"No conclusion can be drawn" is the answer...!

MTH301 Calculus II

Question No : 17 of 26 Marks: 1 (Budgeted Time 1 Min)

If $R = R_1 \cup R_2$, where R_1 and R_2 are no overlapping regions then

$$\iint_{R_1} f(x, y) dA + \iint_{R_2} f(x, y) dA =$$

Answer (Please select your correct option)

$\iint_R f(x, y) dA$

$\iint_{R_1} f(x, y) dA - \iint_{R_2} f(x, y) dA$

$\iint_R f(x, y) dV$

$\iint_{R_1} f(x, y) dA + \iint_{R_2} f(x, y) dA$

Its answer is the first one...!

MTH301 Calculus II

Question No : 18 of 26

Marks: 1 (Budgeted Time 1 Min)

If $R = \{(x, y) : 0 \leq x \leq 2 \text{ and } 1 \leq y \leq 4\}$, then

$$\iint_R (6x^2 + 4xy^3) dA =$$

Answer (Please select your correct option)

$\int_1^4 \int_0^2 (5x^2 + 4xy^3) dy dx$

$\int_1^4 \int_0^2 (5x^2 + 4xy^3) dx dy$

$\int_1^4 \int_0^2 (5x^2 + 4xy^3) dx dy$

$\int_1^4 \int_0^1 (5x^2 + 4xy^3) dx dy$

Its answer is the 3rd option

MTH301 Calculus II

Question No : 19 of 26

Marks: 1 (Budgeted Time 1 Min)

If $K = \{(x, y) : 2 \leq x \leq 4 \text{ and } 1 \leq y \leq 1\}$, then

$$\iint_K (4xe^{2y}) dA =$$

Answer (Please select your correct option)

$\int_2^4 \int_1^4 (4xe^{2y}) dy dx$

$\int_2^4 \int_1^4 (4xe^{2y}) dx dy$

$\int_2^4 \int_1^2 (4xe^{2y}) dx dy$

$\int_2^4 \int_1^2 (4xe^{2y}) dy dx$

It's right one...!

MTH301 Calculus II

Question No : 20 of 26

Marks: 1 (Budgeted Time 1 Min)

If $R = \{(x, y) \mid 0 \leq x \leq 4 \text{ and } 0 \leq y \leq 9\}$, then

$$\iint_R (3x - 4x\sqrt{xy}) \, dA =$$

Answer (Please select your correct option)

$\int_0^4 \int_0^9 (3x - 4x\sqrt{xy}) \, dy \, dx$

$\int_0^4 \int_0^9 (3x - 4x\sqrt{xy}) \, dx \, dy$

$\int_0^5 \int_0^0 (3x - 4x\sqrt{xy}) \, dx \, dy$

$\int_0^4 \int_0^9 (3x - 4x\sqrt{xy}) \, dy \, dx$

This one's also right...

MTH301 Calculus II

Question No : 21 of 25

Marks: 2 (Budgeted Time 4 Min)

Suppose that the surface $f(x, y, z)$ has continuous partial derivatives at the point (a, b, c) . Write down the equation of tangent plane at this point.

Answer (Please click here to Add Answer)

Rich text editor toolbar showing icons for undo, redo, bold, italic, text color, background color, link, unlink, list, and indent, along with a font size dropdown set to 12 and a zoom level dropdown set to 100%.

Its equation is

$$f_x(a)(x - x_0) + f_y(b)(y - y_0) + f_z(c)(z - z_0) = 0$$

MTH301 Calculus II

Question No : 22 of 26 Marks: 2 (Budgeted Time 4 Min)

Evaluate the following double integral.

$$\iint (12xy^2 - 8x^2) \, dy \, dx$$

MTH301 Calculus II

Question No : 23 of 26 Marks: 3 (Budgeted Time 6 Min)

Evaluate the following double integral.

$$\iint (3 + 2x - 3y^2) \, dx \, dy$$

Answer ([Please click here to Edit Answer](#))

These both can be solve by the following example the me gonna paste...!

Evaluate the following double integral.

$$\iint (3 + 2x - 3y^2) \, dx \, dy$$

Solution:

$$\iint (3 + 2x - 3y^2) \, dx \, dy$$

$$\int (3x + 2x^2 - 3xy^2) \, dy$$

$$3xy + 2x^2y - xy^3$$

MTH301 Calculus II

Question No : 24 of 26 Marks: 3 (Budgeted Time 6 Min)

Let $f(x, y, z) = xy^2z^4$
Find the gradient of f .

Answer ([Please click here to Add Answer](#))

didn't got this question dear's...!

MTH301 Calculus II

Question No : 25 of 26

Marks: 5 (Budgeted Time 10 Min)

Find, Equation of Tangent plane to the surface $f(x, y, z) = x^2 + y^2 + z - 9$ at the point $(1, 2, 4)$

Answer ([Please click here to Add Answer](#))

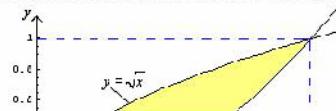
You can use the above tangent equation to solve this...!

MTH301 Calculus II

Question No : 26 of 26

Marks: 5 (Budgeted Time 10 Min)

Use double integral in rectangular co-ordinates to compute area of the region bounded by the curves $y = x^2$ and $y = \sqrt{x}$.



Answer ([Please click here to Add Answer](#))

Its answer is the under mentioned...!

as our require is area of the following region

$V = \iint_R 1 dA = \iint_R dA$ we can compute area by keeping $f(x,y)$ const

$$= \int_0^1 \int_{x^2}^x dy dx$$

$$= \int_0^1 [x]_{x^2}^x$$

$$= \int_0^1 (x - x^2)$$

$$= \left[\frac{x^2}{2} - \frac{x^3}{3} \right]_0^1$$

$$= \left[\frac{1}{2} - \frac{1}{3} \right]$$

$$= \left[\frac{3-2}{6} \right]$$

$$= \frac{1}{6} \text{ that's exactly what we require...!}$$