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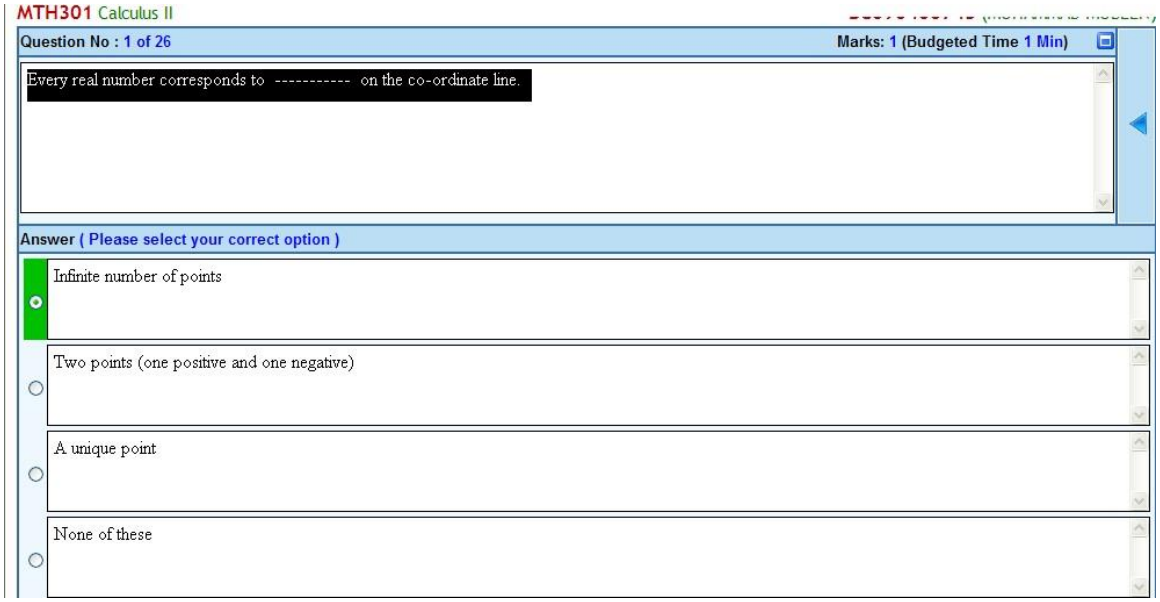
MTH301-MidTerm



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

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

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

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 cylinderical co-ordinates?

Answer (Please select your correct option)

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

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?

Answer (Please select your correct option)

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

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

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

Answer (Please select your correct option)

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

MTH301 Calculus II

Question No : 8 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

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

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?

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

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

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?

Answer (Please select your correct option)

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

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 $\bar{a}$, $\bar{b}$ *and* $\bar{c}$?

Answer (Please select your correct option)

- $\left|\bar{a} \times (\bar{b} \times \bar{c})\right|$
- $\left|\bar{a} \bullet (\bar{b} \bullet \bar{c})\right|$
- $\left|\bar{a} \bullet (\bar{b} \times \bar{c})\right|$
- $\left|\bar{a} \times (\bar{b} \bullet \bar{c})\right|$

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

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

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 $(f_{xx}, f_{yy} \text{ and } f_{xy})$ 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 ----------

Answer (Please select your correct option)

- (●) 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.

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 $(f_{xx}, f_{yy} \text{ and } f_{xy})$ 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 $D = 0$ 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.

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)

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

MTH301 Calculus II

Question No : 18 of 26 **Marks: 1 (Budgeted Time 1 Min)**

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

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

Answer (Please select your correct option)

- $\int_1^4 \int_0^2 (6x^2 + 4xy^3)dydx$
- $\int_0^2 \int_1^4 (6x^2 + 4xy^3)dxdy$
- $\int_1^4 \int_0^2 (6x^2 + 4xy^3)dxdy$
- $\int_2^4 \int_0^1 (6x^2 + 4xy^3)dxdy$

MTH301 Calculus II

Question No : 19 of 26 Marks: 1 (Budgeted Time 1 Min)

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

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

Answer (Please select your correct option)

- $\int_0^1 \int_2^4 (4xe^{2y})dydx$
- $\int_0^1 \int_2^4 (4xe^{2y})dxdy$
- $\int_1^4 \int_0^2 (4xe^{2y})dxdy$
- $\int_1^4 \int_0^2 (4xe^{2y})dydx$

MTH301 Calculus II

Question No : 20 of 26 Marks: 1 (Budgeted Time 1 Min)

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

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

Answer (Please select your correct option)

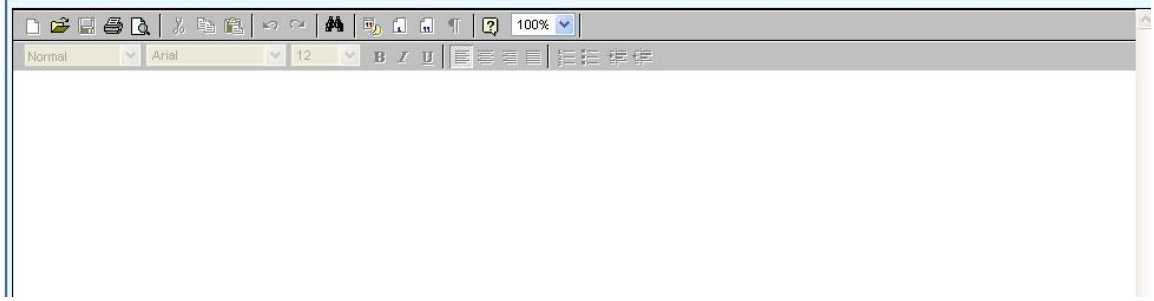
- $\int_0^9 \int_0^4 (3x - 4x\sqrt{xy})dydx$
- $\int_0^4 \int_4^9 (3x - 4x\sqrt{xy})dxdy$
- $\int_4^9 \int_0^0 (3x - 4x\sqrt{xy})dxdy$
- $\int_0^4 \int_0^9 (3x - 4x\sqrt{xy})dydx$

MTH301 Calculus II

Question No : 21 of 26 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)



MTH301 Calculus II

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

Evaluate the following double integral.

$$\iint \left(12xy^2 - 8x^3\right) dy\, dx$$

MTH301 Calculus II

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

Evaluate the following double integral.

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

Answer (Please click here to Edit Answer)

MTH301 Calculus II

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

Let $f(x, y, z) = xy^2e^z$

Find the gradient of f.

Answer (Please click here to Add Answer)

MTH301 Calculus II

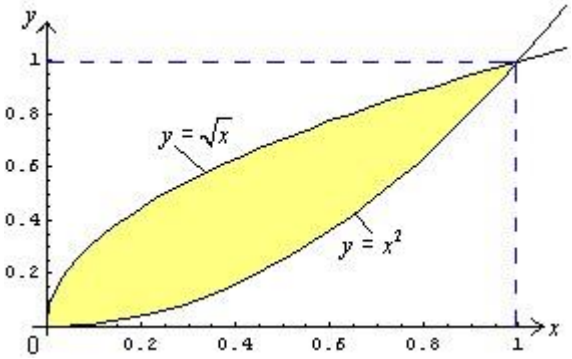
Question No : 25 of 26 Marks: 5 (Budgeted Time 10 Min)

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)

Use double integral in rectangular co-ordinates to compute area of the region bounded

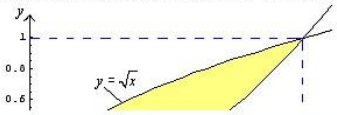
by the curves $\sqrt{\ }$ and .



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)