MTH301 MID FALL 2010

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

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 $\left(f_{xx}\ ,\ \ f_{yy}\ and\ f_{xy}\right)$ 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.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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 $f(x,\ y)=x^3e^{xy}$. 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 $\left(f_{xx}\ ,\ \ f_{yy}\ and\ \ f_{xy}\right)$ 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.

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

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

$$\int_{-1}^{1} \int_{0}^{2} (x + 2y^2)dydx$$

$$\int_{0}^{2} \int_{1}^{-1} (x + 2y^2)dxdy$$

$$\int_{-1}^{1} \int_{0}^{2} (x + 2y^2)dxdy$$

$$\int_{1}^{2} \int_{-1}^{0} (x + 2y^2)dxdy$$

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

If

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

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

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

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

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

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

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

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

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

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

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

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

$Find\ the\ gradient\ of\ f$

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

$$\iint_R f(x,\ y)\ dA = \int \int f(x,\ y)\ \_\_\_\_\_\_$$

2MARKS

Q.Find all critical points of the function
$f(x, y) = 4xy - x^3 - 2y^2$

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

Q-Evaluate the following double integral.
$\iint \left(3 + 2x - 3y^2\right)\ dx\ dy$

3MARKS

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