

$$\log_b a^r = \underline{\hspace{2cm}}$$

▶ $a \log_b r$

▶ $r \log_b a$

▶ $\frac{\log_b a}{\log_b r}$

▶

▶ $\log_b a + \log_b r$

If f is a twice differentiable function at a stationary point x_0 and $f''(x_0) > 0$ then

f has relative At x_0

▶ **Minima**

▶ Maxima

▶ None of these

If f is a twice differentiable function at a stationary point x_0 and $f''(x_0) < 0$ then

f has relative At x_0

▶ Minima

▶ **Maxima**

▶ None of these

A line $x = x_0$ is called ----- for the graph of a function f if

$f(x) \rightarrow +\infty$ or $f(x) \rightarrow -\infty$ as x approaches x_0 from the right or from the left

► **Horizontal asymptotes**

► None of these

► Vertical asymptotes

A line $y = y_0$ is called a for the graph f if

$$\lim_{x \rightarrow +\infty} f(x) = y_0 \quad \text{or} \quad \lim_{x \rightarrow -\infty} f(x) = y_0$$

► Vertical asymptotes

► **Horizontal asymptotes**

► None of these

According to Power-Rule of differentiation, if $f(x) = x^n$ where n is a real number,

then $\frac{d}{dx}[x^n] =$

► x^{n-1}

► nx^{n-1}

► nx^{n+1}

If $f(x) = 3x^8 + 2x + 1$ then $f'(x) =$ _____

► $3x^7 + 2$

► $24x^7 + 2$

► $3x^9 + 2x^2$

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Mid Term

► $24x^9 + 2x^2$

$\frac{d(\tan x)}{dx} =$

► $\sec x$

► $\sec^2 x$

► $\operatorname{cosec} x$

► $\operatorname{cosec}^2 x$

If $y = \frac{1}{1-x}$ then $\frac{dy}{dx} =$

► 1

► -1

► $\frac{1}{(1-x)^2}$

► $\frac{-1}{(1-x)^2}$

If $xy = 4$ then $\frac{dy}{dx} =$

► 0

► $\frac{-1}{x^2}$

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Mid Term

☒ $\frac{4}{x^2}$

☐ $\frac{-4}{x^2}$

If $x^2 + y^2 = 9$ then $\frac{dy}{dx} =$

☐ $\frac{x}{y}$

☒ $\frac{-x}{y}$

☐ $\frac{-y}{x}$

☐ $\frac{y}{x}$

Consider a function $h(x)$ and a constant c then

$\frac{d}{dx}((c) \{h(x)\}) =$ _____

☒ 0

☐ $\frac{d}{dx}(h(x))$

☐ $\frac{d}{dx}(h(cx))$

► $c \frac{d}{dx}(h(x))$

$\frac{d}{dx}[\operatorname{cosec} x] = \underline{\hspace{2cm}}$

► $\frac{1}{1 + \cos^2 x}$

► $\frac{-\cos x}{1 - \cos^2 x}$

► $\frac{-\cos x}{1 - \cos^2 x}$

► $\frac{1}{1 - \cos^2 x}$

If a function g is differentiable at a point x and a function f is differentiable at a point $g(x)$, then the $\underline{\hspace{2cm}}$ is differentiable at point x .

► **Composition** ($f \circ g$)

► Quotient (f / g)

► Product ($f \cdot g$)

► Sum ($f + g$)

If $y = f(g(h(x)))$, $u = g(h(x))$, $v = h(x)$ then $\frac{dy}{dx} = \underline{\hspace{2cm}}$

▶ $\frac{dy}{du} \cdot \frac{du}{dv} \cdot \frac{dv}{dx}$

▶ $\frac{dy}{du} \frac{du}{dv} \frac{dv}{dx}$

▶ $\frac{dv}{du} \cdot \frac{du}{dv} \cdot \frac{dy}{dx}$

Chain rule is a rule for differentiating _____ of functions.

▶ Product

▶ Sum

▶ Difference

▶ **Composition**

Let a function f be defined on an interval, and let x_1 and x_2 denote points in that interval. If $f(x_1) > f(x_2)$ whenever $x_1 < x_2$ then which of the following statement is correct?

▶ **f is an increasing function.**

▶ f is a decreasing function.

▶ f is a constant function.

Let a function f be defined on an interval, and let x_1 and x_2 denotes two

distinct points in that interval. If $f(x_1) = f(x_2)$ for all points x_1 and x_2 then which of the following statement is correct?

- ▶ f is a decreasing function
- ▶ f is an increasing function
- ▶ f is a constant function

If $f''(x) > 0$ on an open interval (a, b) , then which of the following statement is correct?

- ▶ f is concave up on (a, b) .
- ▶ f is concave down on (a, b) .
- ▶ f is linear on (a, b) .

If $x > 0$ then $\frac{d}{dx}[\ln x] =$ _____

- ▶ 1
- ▶ x
- ▶ $\frac{1}{x}$
- ▶ $\ln \frac{1}{x}$

Let $y = (x^3 + 2x)^{37}$. Which of the following is correct?

$$\frac{dy}{dx} = (37)(x^3 + 2x)^{36}$$



$$\frac{dy}{dx} = 111x^2(x^3 + 2x)^{36}$$



$$\frac{dy}{dx} = (111x^2 + 74)(x^3 + 2x)^{36}$$



$$\frac{dy}{dx} = (111x^2 + 74)(x^3 + 2x)^{38}$$



What is the base of natural logarithm?

▶ **2.71**

▶ 10

▶ 5

▶ Any real number

Let x_0 be critical points of the function f . Those critical points for which $f'(x_0) = 0$ are called _____ of f

▶ Local points

▶ End points

▶ **Stationary points**

The average velocity of a body is V_{ave}

$$\frac{d_1 - d_0}{t_1 - t_0}$$



$$\frac{t_1 - t_0}{f(t_0) - f(t_1)}$$



$$\lim_{t_1 \rightarrow t_0} \frac{f(t_0) - f(t_1)}{t_1 - t_0}$$



▶ None of these

Consider two function $f(x) = x^3$ and $g(x) = (x+9)$ then $f \circ g(x) =$

▶ $(x+9)^3$

▶ $x+3$

▶ $x+9$

▶ None of these

Consider two function $f(x) = x^2$ and $g(x) = \sqrt{x}$ then $f \circ g(x) =$

▶ x -correct

▶ x^2

- ▶ $\sqrt{x}$
- ▶ None of these

Consider two function $f(x) = 3\sqrt{x}$ and $g(x) = \sqrt{x}$ what is true about these functions

- ▶ $f(x).g(x) = 3x$
- ▶ $f(x)/g(x) = 3x$
- ▶ $f(g(x)) = 3x$
- ▶ None of these -correct

The centre and the radius of the circle $(x+5)^2 + (y-3)^2 = 16$ is

- ▶ $(-5, 3), 4$
- ▶ $(5, -3), 16$
- ▶ $(5, -3), 4$
- ▶ None of these

The graph $x = y^2$ is symmetric about

- ▶ X-axis
- ▶ Y-axis
- ▶ Origin
- ▶ None of these

The chain rule is used for two function f and g , if we have ----- of these function

- ▶ Product
- ▶ Sum
- ▶ **Composition**
- ▶ None of these

A function f is differentiable function if it is differentiable on the interval

- ▶ **$(-\infty, \infty)$**
- ▶ (a, ∞) where a is any negative integer
- ▶ $(0, \infty)$
- ▶ None of these

A function is said to be continuous function if the function is continuous on the interval

- ▶ **$(-\infty, +\infty)$**
- ▶ $(0, +\infty)$
- ▶ $(-\infty, 0)$
- ▶ None of these

$$\lim_{x \rightarrow 0} \frac{\sin x}{x}$$

- ▶ 1
- ▶ 2
- ▶ **0-correct**
- ▶ $1/2$

For any polynomial $P(x) = c_0 + c_1x + \dots + c_nx^n$ and any real number a

$$\lim_{x \rightarrow a} P(x) = c_0 + c_1a + \dots + c_na^n =$$

▶ $P(a)$ -correct

▶ $P(a+1)$

▶ $P(a-1)$

▶ $\frac{1}{P(a)}$

The no of x and y intercepts for the equation $y=1/x$

▶ Two x intercepts

▶ Two y intercepts

▶ No x and no y intercepts-correct

▶ None of these

A line is called a tangent line to the circle if it meets the circle at precisely

▶ One point -correct

▶ Two points

▶ Infinite points

▶ None of these

If f is a twice differentiable function at a stationary point x_0 and $f''(x_0) < 0$

then f has relative At x_0

- ▶ Minima
- ▶ **Maxima**
- ▶ None of these

If the $\lim_{x \rightarrow a} f(x) = L$ then the inequality $(L - \varepsilon) < f(x) < L + \varepsilon$ holds in any subset of the interval

- ▶ **$(a - \delta, a) \cup (a, a + \delta)$**
- ▶ $(a - 1, a) \cup (a, a + 1)$
- ▶ $(a - \varepsilon, a) \cup (a, a + \varepsilon)$
- ▶ None of these

Questions:

Question No: 1 (Marks: 2)

Show that $f(x) = x^2 - 3x + 1$ is a continuous function.

Question No: 2 (Marks: 2)

Find the range of function f defined by $f(x) = x^2 + 5$

Question No: 3 (Marks: 3)

Differentiate: $y = (\cos x)^{6x}$

Question No: 4 (Marks: 5)

Differentiate w.r.t. x by chain rule $y = \cos^2(x^3)$

Question No: 5 (Marks: 10)

Evaluate the following limit.

$$\lim_{x \rightarrow 2} \frac{x^2 + 4x - 12}{x^2 - 2x}$$

Question No: 6 (Marks: 3)

Discuss the concavity of the function $f(t) = (2-t)(t-3) + 3$ on any interval using second derivative test?

Question No: 7 (Marks: 5)

Find the derivative of the function $y = \ln(1 + x^3)$

Question No: 8 (Marks: 10)

Compute derivative of trigonometric function $\sin(x)$ by definition.

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