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}

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

▶

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

▶

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

▶

▶ None of these

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

▶ $(x+9)^3$

▶ $x+3$

▶ $x+9$

▶ None of these

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

▶ 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* int *eger*
- $(0, \infty)$
- 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

$Lim_{x \to 0} \frac{\sin x}{x}$

- 1
- 2
- 0-correct
- 1/2

For any polynomial $P(x) = c_0 + c_1 x + \ldots + c_n x^n$ and any real number a

$\lim_{x \to a} P(x) = c_0 + c_1 a + \ldots + c_n a^n =$

- $P(a)$ -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 $\lim_{x\to a} f(x) = L$ 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: 10)

Evaluate the following limit.

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

Question No: 2 (Marks: 3)

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

Question No: 3 (Marks: 5)

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

Question No: 4 (Marks: 10)

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