Calculus & Analytical Geometry-I

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

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

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

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

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

A line $y = y_0$ is called a …………….. for the graph f if
$$\lim_{x \to +\infty} f(x) = y_0 \quad or \quad \lim_{x \to -\infty} f(x) = y_0$$

- ► Vertical asymptotes
- ► Horizontal asymptotes
- ► None of these

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

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

- ► $3x^7 + 2$
- ► $24x^7 + 2$
- ► $3x^9 + 2x^2$
- ► $24x^9 + 2x^2$

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

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

► $\sec x$

► $\sec^2 x$

► $co \sec x$

► $co \sec^2 x$

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

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

► 0

► $\dfrac{-1}{x^2}$

► $\dfrac{4}{x^2}$

► $\dfrac{-4}{x^2}$

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

If $2x - y = -3$ then $\dfrac{dy}{dx} =$

► 2

► -2

► 0

► -3

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

$\dfrac{d}{dx}[\sec x] = \underline{\hspace{2cm}}$

► $\dfrac{1}{1+\sin^2 x}$

► $\dfrac{-\sin x}{1+\sin^2 x}$

► $\dfrac{1}{1-\sin^2 x}$

► $\dfrac{\sin x}{1-\sin^2 x}$

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

$30^0 = \underline{\hspace{2cm}}$

$\frac{\pi}{3}$

►

$\frac{\pi}{4}$

►

$\frac{\pi}{6}$

►

$\frac{\pi}{2}$

►

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

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

$$\frac{d}{dx}\big((c)\,\{h(x)\}\big) = \underline{\hspace{2cm}}$$

► 0

► $\frac{d}{dx}\big(h(x)\big)$

► $\frac{d}{dx}\big(h(cx)\big)$

► $c\,\frac{d}{dx}\big(h(x)\big)$

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

Suppose that f and g are differentiable functions of x then

$$\frac{d}{dx}\left[\frac{f}{g}\right] =$$

► $\frac{[g][f']-[f][g']}{g^2}$

► $\frac{[g'][f]-[f'][g]}{g^2}$

► $\frac{[g][f']-[f][g']}{f^2}$

► $\frac{[g'][f]-[f'][g]}{f^2}$

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

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

► $\dfrac{1}{1+\cos^2 x}$

► $\dfrac{-\cos x}{1-\cos^2 x}$

► $\dfrac{-\cos x}{1-\cos^2 x}$

► $\dfrac{1}{1-\cos^2 x}$

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

If $y = f\big(g\big(h(x)\big)\big)$

$u = g\big(h(x)\big)$

$v = h(x)$ then $\dfrac{dy}{dx} = \underline{\hspace{2cm}}$

► $\dfrac{dy}{du}.\dfrac{du}{dv}.\dfrac{dv}{dx}$

► $\dfrac{dy}{du}\dfrac{du}{dv}\dfrac{dv}{dx}$

► $\dfrac{dv}{du}.\dfrac{du}{dv}.\dfrac{dy}{dx}$

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

Chain rule is a rule for differentiating _____ of functions.

► Product
► Sum
► Difference
► Composition

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

$$\frac{d}{dx}[x^n] = nx^{n-1}$$

The power rule,   holds if n is _____

- ► An integer
- ► A rational number
- ► An irrational number
- ► All of the above

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

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

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

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).

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

$$If \quad x > \frac{1}{2} \quad then \quad \frac{d}{dx}[\ln 2x] = \underline{\hspace{2cm}}$$

- ► $\dfrac{1}{x}$
- ► $\dfrac{2}{x}$
- ► $\dfrac{1}{2x}$
- ► $\dfrac{2}{x^2}$

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

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

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

- ►

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

►

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

►

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

►

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

If we have $x^2 + y^2 = 1$ then $\frac{dy}{dx} = $ _____

$$\frac{-x}{y}$$

►

$$\frac{x}{y}$$

►

$$\frac{-y}{x}$$

►

► None of these

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

$\log_b ac = $ _____

► $\log_b a + \log_b c$

► $\log_b a - \log_b c$

► $\dfrac{\log_b a}{\log_b c}$

► $(\log_b a)(\log_b c)$

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

$\log_b a^r = $ _____

► $a \log_b r$

► $r \log_b a$

$$\frac{\log_b a}{\log_b r}$$

▶

▶ $\log_b a + \log_b r$

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

$$\log_b \frac{1}{c} = \underline{\hspace{1.5cm}}$$

▶ $\log_b c$

▶ $1 - \log_b c$

▶ $-\log_b c$

▶ $1 + \log_b c$

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

$$\log_b \frac{1}{t} = \underline{\hspace{1.5cm}}$$

▶ $\log_b t$

▶ $1 - \log_b t$

▶ $1 + \log_b t$

▶ $-\log_b t$

Question No: 25   (Marks: 3)

Differentiate:

$$f(t) = \left(t^3 + 4\right)^4$$

$$f`(t) = 4\left(t^3 + 4\right)^3 . \frac{d}{dx}\left(t^3 + 4\right)$$

$$f`(t) = 4\left(t^3 + 4\right)^3 . 3t^2$$

$$f`(t) = 12t^2 \left(t^3 + 4\right)^3$$

Question No: 26   (Marks: 5)

$$\sqrt{13x^2 - 5x + 8}$$

Differentiate $$f`(x) = \frac{1}{2\sqrt{13x^2 - 5x + 8}} \frac{d}{dx} 13x^2 - 5x + 8$$

$$f`(x) = \frac{1}{2\sqrt{13x^2 - 5x + 8}} . 26x - 5$$

Question No: 27   (Marks: 10)

Differentiate the following function

$$f(x) = x^3 \cdot e^{\frac{1}{x}}$$

$$f`(x) = 3x^2 \cdot e^{\frac{1}{x}} + x^3 \cdot e^{\frac{1}{x}} - \frac{1}{x^2}$$

$$f`(x) = 3x^2 \cdot e^{\frac{1}{x}} - \frac{x^3 \cdot e^{\frac{1}{x}}}{x^2}$$

$$f`(x) = e^{\frac{1}{x}}[3x^2 - \frac{x^3}{x^2}]$$

$$f`(x) = e^{\frac{1}{x}}[\frac{3x^4 - x^3}{x^2}]$$

$$f`(x) = xe^{\frac{1}{x}}[\frac{3x^3}{x^2} - \frac{x^2}{x^2}]$$

$$f`(x) = xe^{\frac{1}{x}}[3x - 1]Ans$$