

CONTINUITY AND DIFFERENTIABILITY**SECOND ORDER DERIVATIVE****EXERCISE**

Q.1 Determine the second order derivative of $y = 9\log t^3$.

(a) $\frac{27}{t^2}$

(b) $-\frac{27}{t^2}$

(c) $-\frac{1}{t^2}$

(d) $-\frac{27}{2t^2}$

Q.2 Given $y = \tan^2 x + 3\tan x$, then find $\frac{d^2y}{dx^2}$

(a) $\sec^2 x \tan x(2 \tan x + \sec x + 3)$

(b) $2\sec^2 x \tan x(2 \tan x - \sec x + 3)$

(c) $2\sec^2 x \tan x(2 \tan x + \sec x + 3)$

(d) $2\sec^2 x \tan x(2 \tan x + \sec x - 3)$

Q.3 Check the following statement is true or false:

If $y = 6x^2 + 3$, then $\left(\frac{dy}{dx}\right)^2 = \frac{d^2y}{dx^2}$.

(a) True

(b) False

Q.4 Solve the second order derivative of $y = 2e^{2x} - 3\log(2x - 3)$.

(a) $8e^{2x} + \frac{1}{(2x-3)^2}$

(b) $8e^{2x} - \frac{12}{(2x-3)^2}$

(c) $e^{2x} + \frac{12}{(2x-3)^2}$

(d) $8e^{2x} + \frac{12}{(2x-3)^2}$

Q.5 Solve $\frac{d^2y}{dx^2}$ if $y = 2\sin^{-1}(\cos x)$ is given.

- (a) 0 (b) $\sin^{-1}\left(\frac{1}{\cos x}\right)$ (c) 1 (d) -1

Q.6 What is the value of $\frac{d^2y}{dx^2}$ if $y = \log(2x^3)$.

- (a) $-\frac{2}{x^2}$ (b) $\frac{3}{x^2}$ (c) $\frac{2}{x^2}$ (d) $-\frac{3}{x^2}$

Q.7 Find the value $\frac{d^2y}{dx^2} - 6\frac{dy}{dx}$ if $y = 4x^4 + 2x$ is given.

- (a) $(4x^2 + 8x - 1)$ (b) $12(4x^2 + 8x - 1)$
(c) $-12(4x^2 + 8x - 1)$ (d) $12(4x^2 - 8x - 1)$

Q.8 Determine the second order derivative of $y = e^{2x} + \sin^{-1} e^x$.

- (a) $e^{2x} + \frac{e^x}{(1 - e^{2x})^{3/2}}$ (b) $4e^{2x} + \frac{1}{(1 - e^{2x})^{3/2}}$
(c) $4e^{2x} - \frac{e^x}{(1 - e^{2x})^{3/2}}$ (d) $4e^{2x} + \frac{e^{x^2}}{(1 - e^{2x})^{3/2}}$

Q.9 What is the second order derivative of $y = 3x^2 + \log(4x)$

- (a) $3 + \frac{1}{x^2}$ (b) $3 - \frac{1}{x^2}$ (c) $6 - \frac{1}{x^2}$ (d) $6 + \frac{1}{x^2}$

Q.10 What is the second order derivative of $y = e^{2x^2}$

- (a) $4e^{2x^2}(4x^2 + 3)$ (b) $4e^{2x^2}(4x^2 - 1)$
(c) $4e^{2x^2}(4x^2 + 1)$ (d) $e^{2x^2}(4x^2 + 1)$

ANSWER KEY

1. (b)
2. (c)
3. (b)
4. (d)
5. (a)
6. (d)
7. (d)
8. (d)
9. (c)
10. (c)