BYJU'S Study Planner for Board Term I
(CBSE Grade 12)

Date: 21/11/2021

Subject: Mathematics

Topic : Application of Derivative Class: Standard XII

1. The tangent to the curve $y = xe^{x^2}$ is passing through the point $(1, e)$ and also passes through the point :

   A. $(2, 3e)$

   B. $(3, 6e)$

   C. $\left(\frac{4}{3}, 2e\right)$

   D. $\left(\frac{5}{3}, 2e\right)$

2. The normal to the curve $y(x-2)(x-3) = x+6$ at the point where the curve intersects the y-axis passes through the point:

   A. $\left(-\frac{1}{2}, -\frac{1}{2}\right)$

   B. $\left(\frac{1}{2}, \frac{1}{2}\right)$

   C. $\left(\frac{1}{2}, -\frac{1}{3}\right)$

   D. $\left(\frac{1}{2}, \frac{1}{3}\right)$

3. Let C be a curve given by $y(x) = 1 + \sqrt{4x-3}, x > \frac{3}{4}$. If P is a point on C, such that the tangent at P has slope $\frac{2}{3}$, then a point through which the normal at P passes, is:

   A. $(3, -4)$

   B. $(1, 7)$

   C. $(2, 3)$

   D. $(4, -3)$

BYJU'S Study Planner for Board Term I
(CBSE Grade 12)

4. The approximate change in volume V of a cube of side x meters caused by increasing the side by 2% is:

   A. $0.03x^3$ cubic meter

   B. $0.04x^3$ cubic meter

   C. $0.06x^3$ cubic meter

   D. $0.08x^3$ cubic meter

5. The approximate value of $f(5.001)$ where $f(x) = x^3 - 7x^2 + 15$, is:

   A. -34.995

   B. 34.995

   C. -35.005

   D. 35.005

6. A particle moves in a straight line according to the law $v^2 = 4a(x \sin x + \cos x)$ where v is the velocity of a particle at a distance x from the fixed point. Then the acceleration is

   A. $2ax \sin x$

   B. $ax \sin x$

   C. $ax \cos x$

   D. $2ax \cos x$

BYJU'S Study Planner for Board Term I
(CBSE Grade 12)

7. Coffee is coming out from a conical filter, with height and diameter both are 15 cm into a cylindrical coffee pot with a diameter 15 cm. The rate at which coffee comes out from the filter into the pot is $100 \text{ cm}^3/\text{min}$.

   The rate (in cm/min) at which the level of coffee in the pot is rising at the instance when it is 10 cm, is equal to

   A. $\frac{16}{9\pi}$

   B. $\frac{5}{3\pi}$

   C. $\frac{9}{16\pi}$

   D. $\frac{4}{3\pi}$

8. The approximate value of $(25)^{\frac{1}{3}}$ is

   A. 2.921

   B. 2.923

   C. 2.924

   D. 2.926

9. A particle moves on a line according to the law $s = at^2 + bt + c$. If the displacement after one second is 16 cm, the velocity after 2 seconds is 24 cm/sec and the acceleration is 8 cm/sec^2, then (a, b, c)

   A. $(4, 8, 4)$

   B. $(4, 4, 8)$

   C. $(8, 4, 4)$

   D. $(8, 8, 4)$

BYJU'S Study Planner for Board Term I (CBSE Grade 12)

10. If the rate of change in the volume of a sphere is equal to the rate of change in its radius, then the radius is equal to

A. $\frac{1}{2\pi}$

B. $\frac{1}{2\sqrt{\pi}}$

C. $\frac{1}{\sqrt{2\pi}}$

D. $\frac{2}{\pi}$

11. The normal to the curve $x = a(\cos\theta + \theta\sin\theta), y = a(\sin\theta - \theta\cos\theta)$ at any point θ is such that

A. it makes a constant angle with the $x-$ axis.

B. it passes through origin.

C. it is at a constant distance from the origin.

D. none of these

12. If $3x + 2y = 1$ acts as a tangent to $y = f(x)$ at $x = \frac{1}{2}$ and if $p = \lim_{x\to 0} \frac{x(x-1)}{f\left(\frac{e^{2x}}{2}\right) - f\left(\frac{e^{-2x}}{2}\right)}$, then $\sum_{r=1}^{\infty} p^r =$______

A. $\frac{1}{2}$

B. $\frac{1}{3}$

C. $\frac{1}{6}$

D. $\frac{1}{7}$

BYJU'S Study Planner for Board Term I
(CBSE Grade 12)

13. The normal to the curve $x = a(1 + \cos\theta), y = a\sin\theta$ at θ always passes through the fixed point

A. $(a, 0)$

B. $(0, a)$

C. $(0, 0)$

D. (a, a)

14. If m is the slope of a tangent to the curve $e^y = 1 + x^2$, then

A. $|m| > 1$

B. $m > 1$

C. $m > -1$

D. $|m| \leq 1$

15. The equation of the tangent to the curve $y = x + \dfrac{4}{x^2}$, which is parallel to the $x-$ axis, is

A. $y = 8$

B. $y = 0$

C. $y = 3$

D. $y = 2$

BYJU'S Study Planner for Board Term I
(CBSE Grade 12)

16. The number of tangent(s) to the curve $y=\cos(x+y), -2\pi \leq x \leq 2\pi$, that is (are) perpendicular to the line $2x-y=3$ is

A. 1

B. 2

C. 3

D. 4

17. If $2a+3b+6c=0$, then atleast one root of the equation $ax^2+bx+c=0$ lies in the interval

A. $(0,1)$

B. $(1,2)$

C. $(2,3)$

D. $(1,3)$

18. If $f(x)=x^3+bx^2+ax$ satisfies the condition of Rolle's theorem on $[1,3]$ with $c=2+\frac{1}{\sqrt{3}}$. Then $(a+b)=$

A. 0

B. 3

C. -4

D. 5

BYJU'S Study Planner for Board Term I
(CBSE Grade 12)

19. Let f be differentiable for all x. If $f(1) = -2$ and $f'(x) \geq 2$ for all $x \in [1, 6]$, then

A. $f(6) < 8$

B. $f(6) \geq 8$

C. $f(6) \geq 5$

D. $f(6) \leq 5$

20. Given the function $f(x) = x^3 - 2x^2 - x + 1$. Then the value(s) of c satisfying the conditions of the mean value theorem for the function on the interval $[-2, 2]$, is

A. ± 1

B. $\frac{2}{3}$

C. $-\frac{2}{3}$

D. 2