

For any question you may answer E) "None Of The Answers".

1) Evaluate $\lim_{x \rightarrow 1} \frac{\sqrt{4x^4 + x^2 - 5}}{x^2 - 1}$

- A) 2
- B) 0
- C) 3
- D) Limit does not exist
- E) NOTA

2) Which of the following values for m would make the line $y = mx$ tangent to the graph of $y = x^2 + a^2$?

- A) a
- B) $2a$
- C) $\frac{1}{a}$
- D) No values
- E) NOTA

3) The partial fraction decomposition of $\frac{5x^2 - 2x + 3}{(x-3)(x^2+1)}$ will have the form:

- A) $\frac{A}{(x-3)} + \frac{B}{(x^2+1)}$
- B) $\frac{A}{(x-3)} + \frac{B}{(x+1)} + \frac{C}{(x-1)}$
- C) $\frac{A}{(x-3)} + \frac{B}{(x+1)} + \frac{C}{(x^2+1)}$
- D) $\frac{A}{(x-3)} + \frac{Bx+C}{(x^2+1)}$
- E) NOTA

For any question you may answer E) "None Of The Answers".

- 4) Bob moves along a horizontal line according to the law $s = t^4 - 6t^3 + 12t^2 + 3$. The velocity of Bob is increasing for:

- A) $(-\infty, 0)$
- B) $(0, \infty)$
- C) $(-\infty, 1) \cup (2, \infty)$
- D) $(1, 2)$
- E) NOTA

5) Find $\sum_{n=2}^{\infty} \frac{1}{n(n+1)}$

- A) $\frac{1}{2}$
- B) 1
- C) 2
- D) Divergent series
- E) NOTA

- 6) Suppose $f(x) = \frac{3x(x-1)}{x^2 - 3x + 2}$, for $x \neq 1, 2$, and $f(1) = -3, f(2) = 4$. Then $f(x)$ is continuous:

- A) Except at $x = 1$
- B) At each real number
- C) Except at $x = 1$ or $x = 2$
- D) Except at $x = 2$
- E) NOTA

For any question you may answer E) "None Of The Answers".

7) If $f(x) = \int_4^x e^{t^2} dt$, then $f'(5)$ is:

- A) e^{10}
- B) e^{25}
- C) $10e^{25}$
- D) Cannot be determined analytically
- E) NOTA

8) The arc length of $y = \ln|\cos x|$ from $(0,0)$ to $(a, \ln|\cos a|)$ (where $a < \frac{\pi}{2}$) is given by:

- A) $\int_0^a (\sqrt{1 + \cos^2 x}) dx$
- B) $\int_0^a (\sin x) dx$
- C) $\int_0^a (\sec x) dx$
- D) $\int_0^a (\ln|\cos x|) dx$
- E) NOTA

9) If $f(x) = x^3 - 2x^2 + 3x + 4$ and $g(x) = 4x^2 + 2x + 10$, find $\frac{dy}{dx}$ at $x = -1$ if $y = f(g(x))$

- A) -2322
- B) 387
- C) 381
- D) -1548
- E) NOTA

For any question you may answer E) “None Of The Answers”.

10) On which of the following can L'Hôpital's Rule **NOT** be applied?

A) $\lim_{x \rightarrow \infty} \frac{\cos x}{x}$

B) $\lim_{x \rightarrow 0} \frac{\sin x}{x^2}$

C) $\lim_{x \rightarrow \infty} \frac{x}{\sqrt{1+x^2}}$

D) $\lim_{x \rightarrow 0} x \ln x$

E) NOTA

11) Find the eighth term of the recursively defined sequence $a_n = n - a_{n-1}$ if $a_1 = 3$

A) 1

B) 3

C) 5

D) 7

E) NOTA

12) Find $\int_{-2}^2 \frac{1}{|x|} dx$

A) 0

B) $\ln 2$

C) $2 \ln 2$

D) Integral diverges

E) NOTA

For any question you may answer E) "None Of The Answers".

13) Find $\frac{dy}{dx}$ if $x^2y = \sin(xy)$:

- A) $\frac{\cos(xy)}{2}$
- B) $\frac{y \cos(xy) - 2xy}{x^2 - x \cos(xy)}$
- C) $\frac{2xy}{\cos(xy) - x^2}$
- D) $\frac{\cos(xy) + x^2}{2x - y \cos(xy)}$
- E) NOTA

14) Find $\frac{d}{dx}(x^{x-1})$

- A) $\frac{x^x - x \ln x}{x^2}$
- B) $(x-1)x^{x-2} \ln x$
- C) $x^{x-1} \ln x + (x-1)^x$
- D) $x^{x-1} \ln x + x^{x-2}(x-1)$
- E) NOTA

15) Which of the following is **NOT** a cube root of -8 ?

- A) $1 + i\sqrt{3}$
- B) $\sqrt{2} - i\sqrt{2}$
- C) $1 - i\sqrt{3}$
- D) -2
- E) NOTA

For any question you may answer E) "None Of The Answers".

16) $\int (e^{3x} \sin 2x) dx = ?$

A) $\frac{e^{3x}(3 \sin 2x - 2 \cos 2x)}{13} + C$

B) $\frac{e^{3x}(3 \cos 2x - 2 \sin 2x)}{13} + C$

C) $\frac{e^{3x}(3 \sin 2x + 2 \cos 2x)}{13} + C$

D) $\frac{e^{3x}(3 \cos 2x + 2 \sin 2x)}{13} + C$

E) NOTA

17) The horizontal asymptote(s) of the function $f(x) = \frac{9x}{\sqrt{x^2 + 7}}$ is/are:

A) $y = \pm 9$

B) $y = 0$

C) $y = 9$

D) $y = \frac{9}{7}$

E) NOTA

18) Find $D_x[\cos^4(\sin x^2)]$

A) $-4x \cos^3(\sin x^2) \cos x^2 \sin(\sin x^2)$

B) $-8x \cos^3(\sin x^2) \cos x \sin(\sin x^2)$

C) $-8x \cos^3(\sin x^2) \cos x^2 \sin(\sin x^2)$

D) $-4x \cos^3(\sin x^2) \cos^2(\sin(\sin x^2))$

E) NOTA

For any question you may answer E) "None Of The Answers".

19) Which value of c makes the function $f(x) = \begin{cases} x^2 + 2x + c & x \leq 0 \\ c(x+1) & x > 0 \end{cases}$ smooth and continuous everywhere?

- A) $c = -2$
- B) $c = -1$
- C) $c = 1$
- D) $c = 2$
- E) NOTA

20) The graph of $3x^2 + 2y^2 - 6x + 12y + 21 = 0$:

- A) Is a circle
- B) Is an ellipse
- C) Is a point
- D) Is a hyperbola
- E) NOTA

21) The graph of $r = 1 + 2 \cos \theta$:

- A) Is a circle
- B) Is a limaçon
- C) Is a cardioid
- D) Is a rose curve
- E) NOTA

22) The tangent(s) to the curve $y^2 + xy + 9 = 0$ is/are vertical when:

- A) $x = 0$
- B) $x = \pm 6$
- C) $x = \pm\sqrt{3}$
- D) $x = \pm 3$
- E) NOTA

For any question you may answer E) "None Of The Answers".

23) The volume of the solid formed by revolving the area bounded by the graph $y = e^{-x^2}$ and the lines $x = 0$, $x = \sqrt{\ln 3}$ and $y = 0$ about the y -axis is:

- A) $\frac{\pi}{3}$
- B) $\frac{2\pi}{3}$
- C) π
- D) $\frac{4\pi}{3}$
- E) NOTA

24) If $f(x) = e^x(\sin x - \cos x)$ then $\frac{f^{(8)}(x)}{f^{(4)}(x)} = ?$

- A) 4
- B) -4
- C) $4 \frac{\sin x + \cos x}{\sin x - \cos x}$
- D) $-4 \frac{\sin x + \cos x}{\sin x - \cos x}$
- E) NOTA

25) If the graph of $f(x)$ passes through the origin, increasing and concave down then which of the following is true?

- A) $f(0) < f''(0) < f'(0)$
- B) $f'(0) < f(0) < f''(0)$
- C) $f''(0) < f(0) < f'(0)$
- D) $f'(0) < f''(0) < f(0)$
- E) NOTA