

If none of the answers given is correct choose e) NOTA.

1. What is the range of f if $f(x) = -3\sin(2x+4) - 3$.

- a) $[-3, 0]$ b) $[-3, 3]$ c) $[-6, 6]$ d) $[-6, 0]$ e) NOTA

2. What are the coordinates of the center of the polar graph $r = -3\sin\theta$?

- a) $(0, -1.5)$ b) $(0, -3)$ c) $(-1.5, 0)$ d) $(0, 3)$ e) NOTA

3. $S = a(1.08)^t$. $t =$

- a) $\frac{\ln S - \ln a}{\ln 1.08}$ b) $\frac{\ln(S - a)}{\ln 1.08}$ c) $\frac{\ln S}{\ln a} - \ln 1.08$ d) $\frac{\ln S}{\ln a + \ln 1.08}$ e) NOTA

4. The complex number $1 - 4i$ is a zero of $f(x) = x^4 - 4x^3 + 18x^2 - 28x - 51$. Find the product of the other three zeroes.

- a) $2 + 8i$ b) $\frac{51+204i}{15}$ c) $-3 - 12i$ d) $\frac{-17-68i}{5}$ e) NOTA

5. The following three transformations are applied to the graph of $y = \sqrt{x}$. i) a vertical stretch by a factor of 4; ii) a horizontal shift left of 3 units; and iii) a vertical shift of 5 units. An equation for the graph produced is $y =$

- a) $\sqrt{4x-3} + 5$ b) $4\sqrt{x+3} + 5$ c) $\sqrt{4x+12} + 5$ d) $4\sqrt{x-3} + 5$ e) NOTA

6. Find the sum of the solutions of $\sin x \tan x - \sin x + \tan x - 1 = 0$ over $[0, 2\pi)$.

- a) 2π b) $\frac{5\pi}{2}$ c) 3π d) $\frac{9\pi}{2}$ e) NOTA

7. Determine the measure of an angle θ coterminal to an angle of -140° if $360^\circ < \theta < 720^\circ$.

- a) 500° b) 540° c) 560° d) 680° e) NOTA

8. A swimming pool is 10 ft longer than it is wide. The pool is surrounded by a walkway of width 4 ft. The combined area of the pool and the walkway is 1440 ft. Find the length of the pool to the nearest hundredth.

- a) 22.16 b) 25.28 c) 29.28 d) 35.28 e) NOTA

9. What is the domain of $f(x) = \sin^{-1}(5x)$?

- a) $[-\frac{\pi}{2}, \frac{\pi}{2}]$ b) $[-1, 1]$ c) $[-0.5, 0.5]$ d) $[-0.2, 0.2]$ e) NOTA

10. How many five digit numbers between 56,000 and 60,000 can be made if no digit is repeated?

- a) 1344 b) 1680 c) 2688 d) 2880 e) NOTA

11. $\triangle ABC$ is a right triangle with right angle at C. If its vertices are $A(-1, 2)$, $B(4, -3)$ and $C(-2, k)$, $k \neq 0$, what is the value of $\sin(k)$ to the nearest hundredth?

- a) -0.84 b) -0.02 c) 0.02 d) 0.96 e) NOTA

12. $\begin{bmatrix} 4 & 7 \\ -2 & b \end{bmatrix} \cdot \begin{bmatrix} a & 2 \\ 5 & -1 \end{bmatrix} = \begin{bmatrix} 43 & 1 \\ m & 10 \end{bmatrix}$ Find m .

- a) -74 b) -68 c) 34 d) 66 e) NOTA

13. $\cos(30^\circ - x) + \cos(30^\circ + x) =$

- a) $\cos(x)$ b) $\sqrt{3} \sin(x)$ c) $\sqrt{3} \cos(x)$ d) $\frac{\sqrt{3}}{2} \sin(x)$ e) NOTA

14. An isosceles triangle has a base of 22cm and a vertex angle measuring 36° . Find its perimeter to the nearest thousandth.

- a) 48.128 b) 93.193 c) 114.239 d) 116.125 e) NOTA

15. The equation of a hyperbola that passes through $(4, 2)$ and has asymptotes with equations $y = 2x$ and $y = -2x + 4$ can be written in the form $\frac{(x-h)^2}{r} - \frac{(y-k)^2}{s} = 1$. Find the value of s .

- a) 9 b) 36 c) 40 d) 42 e) NOTA

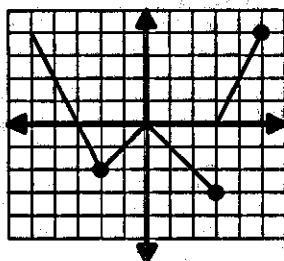
16. A point P in the first quadrant lies on the graph of $y = x^3$. Which of the following expresses the coordinates of P as a function of the angle of inclination of the line joining P to the origin?

- a) $(\tan x, \tan^3 x)$ b) $(\sqrt[3]{\tan x}, \tan x)$ c) $(\sqrt{\tan x}, \sqrt{\tan^3 x})$ d) $(\tan x, \tan^{\frac{3}{2}} x)$ e) NOTA

17. The given parametric equation is equivalent to which of the following Cartesian equations?
 $x = \ln(t), y = \tan(t)$

- a) $y = \ln(\arctan x)$ b) $y = \ln(\tan x)$ c) $y = e^{\tan x}$ d) $y = \tan(e^x)$ e) NOTA

18. Given the graph of function f below, which of the following are true?



- i) f is continuous at $x = 0$.
 ii) $\lim_{x \rightarrow 0} f(x) = 0$
 iii) $f(3) = -3$
 iv) $\lim_{x \rightarrow 3} f(x) = -3$

- a) i, ii, iii b) i, iii c) i, iii, iv d) All are true. e) NOTA

19. Which of the following is a vector 6 units long in the direction of $\vec{v} = 2i + 2j - k$?

- a) $3i + 3j - 3\sqrt{2}j$ b) $\frac{2}{3}i + \frac{2}{3}j - \frac{1}{3}k$ c) $4i + 4j - 2k$ d) $12i + 12j - 6k$ e) NOTA

20. If $\begin{vmatrix} x & x & 1 \\ 2 & 0 & 5 \\ 6 & 7 & 1 \end{vmatrix} = 0$, then the tenths digit of $\ln(x)$ is

- a) 1 b) 2 c) 4 d) 7 e) NOTA

21. Given $\triangle ABC$ with $A = 35^\circ$ and $B = 81^\circ$, which statement is true?

- a) $c = \frac{a \sin 81^\circ}{\sin 35^\circ}$ b) $a = \frac{c \sin 35^\circ}{\sin 64^\circ}$ c) $C = 74^\circ$ d) $a = \frac{b \sin 64^\circ}{\sin 81^\circ}$ e) NOTA

22. The limit of $\frac{\sqrt{2n+1}}{n}$ as n increases without bound is

- a) 0 b) 1.412 c) $\sqrt{2}$ d) 2 e) NOTA

23. After one minute a hot air balloon rose 80 ft. After that time each succeeding minute the balloon rose 65% as far as it did the previous minute. To the nearest hundredth what is the maximum height of the balloon?

- a) 123.08 b) 148.57 c) 228.57 d) 256.72 e) NOTA

24. A swimming pool can be filled by a pipe in 10 hours. Its drain will empty the pool in 20 hours. The pool is initially empty and the pipe is turned on, but the drain is mistakenly left open. In hours how long will it take to fill the pool?

- a) 20 b) 22.5 c) 24 d) 25.2 e) NOTA

25. $1 < x < 1000$. Let A be the largest value of x for which $a^2 = b^3 = x$, for some integral value of a and b. What is $\sin(A)$ to the nearest hundredths?

- a) 0.06 b) 0.15 c) 0.82 d) 0.92 e) NOTA

26. Find the x coordinate of the center of a circle tangent to the line $3x + y + 2 = 0$, at (-1,1) and passing through the point (3,5).

- a) 0.5 b) 1 c) 2 d) 2.5 e) NOTA

27. Let k be the value so that the function defined by $f(x) = \frac{x+5}{x+k}$ will be its own inverse. Find $\tan(k)$ to the nearest tenth.

- a) -1.6 b) -0.9 c) 1.2 d) 2.4 e) NOTA

28. Suppose the value of an old comic book varies inversely with the number of copies that still exist. If 100,000 exist, each copy would be worth \$0.35. How much would each be worth if only 14 copies still exist?

- a) \$1200 b) \$1675 c) \$2100 d) \$2500 e) NOTA

29. A tire is out of round so that the radius in a certain direction is 1 inch more than in the opposite direction. If the angular speed is 40 rad/s what is the difference in linear speed between these two points on the tire in in/s?

- a) 28.5 b) 32.6 c) 40 d) 45 e) NOTA

30. What is the reciprocal of $\frac{1}{1 + \frac{1}{a+b}}$, $a + b \neq 0$.

- a) $\frac{1}{a+b}$ b) $a + b$ c) $\frac{a+b}{a+b+1}$ d) $\frac{a+b+1}{a+b}$ e) NOTA