For all questions "e" represents "none of the above."

$rcisx = r\cos x + ri\sin x$

When any arcsine, arccosine, arctangent etc. is used in the test, the traditional restricted ranges are assumed, to ensure that the relation is a function. $\cos^{-1}\theta$ is equivalent to $\arccos\theta$.

1. The terminal side of an angle lies on the line $2x-3y=6$, which statement is **true**?

a. $\tan\theta = -\frac{2}{3}$ b. $\tan\theta = -\frac{3}{\sqrt{13}}$ c. $\cot\theta = \frac{3}{2}$ d. $\csc\theta = \frac{\sqrt{13}}{3}$ e. NOTA

2. Which of the following angles is **not** coterminal to $\frac{23\pi}{5}$?

a. $-\frac{33\pi}{5}$ b. $\frac{13\pi}{5}$ c. $-\frac{7\pi}{5}$ d. $\frac{73\pi}{5}$ e. NOTA

3. Evaluate: $\begin{vmatrix} \sin\frac{3\pi}{2} & \sin 2\pi & \cos 4\pi \\ \left(\sin\frac{\pi}{3}\right)^2 & \sec 0 & \cot\left(\frac{3\pi}{4}\right) \\ \cos\left(\frac{9\pi}{2}\right) & \tan\left(-\frac{5\pi}{4}\right) & \left(\csc\frac{\pi}{4}\right)^4 \end{vmatrix}$

a. $-\frac{15}{4}$ b. $-\frac{9}{4}$ c. $-\frac{3}{4}$ d. –5 e. NOTA

4. For what value of *a* makes the following equation true?

$\arcsin\left(\frac{\sqrt{25-x^2}}{5}\right) = \arctan(a),\ 0 < x \le 5$

a. $\sqrt{25-x^2}$ b. $\frac{\sqrt{25-x^2}}{x^2}$ c. $\frac{x}{5}$ d. $\frac{\sqrt{25-x^2}}{x}$ e. NOTA

5. Find the area of triangle MAT, when $m\angle T = 150^\circ$, $a = 4$, and $m = 2$.

a. 2 b. $2\sqrt{3}$ c. 4 d. $4\sqrt{3}$ e. NOTA

6. Which function is **odd**?

a. $f(x) = \sin(x-2)$ b. $f(x) = 2\cos x$ c. $f(x) = \tan 2x$ d. $f(x) = \sec x - 2$ e. NOTA

7. Find the exact value of $\cos\left(75^\circ\right)$.

a. $\frac{\sqrt{2+\sqrt{3}}}{2}$ b. $\frac{\sqrt{2-\sqrt{3}}}{2}$ c. $\frac{\sqrt{6}+\sqrt{2}}{4}$ d. $\frac{\sqrt{2}-\sqrt{6}}{4}$ e. NOTA

8. Evaluate: $\cos^{-1}\left(\cos 225^\circ\right)$

a. 45° b. 135° c. 225° d. -45° e. NOTA

9. Find the sum of the frequency, period, and amplitude of the function: $f(x) = 2 - 3\sin(3\pi x + 2)$

a. $\frac{13}{6}$ b. $-\frac{5}{6}$ c. $\frac{27}{6}$ d. $\frac{31}{6}$ e. NOTA

10. Identify the vertical asymptotes when $0 \le x \le 2\pi$. $m(x) = \frac{1}{2012\sin^2 x - 2012}$

a. $x = \frac{\pi}{2}$ b. $x = \frac{\pi}{2}, x = \frac{3\pi}{2}$ c. $x = 0$ d. $x = 0, x = \pi, x = 2\pi$ e. NOTA

11. Simplify: $\dfrac{\csc\theta}{\sin^2\theta+\sec\theta+\cos^2\theta-1}$, when $\sin\theta\cos\theta\neq 0$

a. $\csc^2\theta$ b. $\tan\theta$ c. $\cot\theta$ d. $\csc\theta\sec\theta$ e. NOTA

12. Simplify: $\sin\left(\dfrac{\pi}{4}+x\right)+\sin\left(\dfrac{\pi}{4}-x\right)$

a. $\sqrt{2}\cos x$ b. $2\cos x$ c. $\cos x$ d. 0 e. NOTA

13. Solve $2\cos x\csc x-4\cos x-\csc x=-2$ when $x\in[0,2\pi)$.

a. $\left\{\dfrac{\pi}{6},\dfrac{\pi}{3},\dfrac{2\pi}{3},\dfrac{5\pi}{6}\right\}$ b. $\left\{\dfrac{\pi}{6},\dfrac{\pi}{3},\dfrac{5\pi}{6},\dfrac{5\pi}{3}\right\}$ c. $\left\{0,\dfrac{\pi}{6},\dfrac{2\pi}{3},\pi\right\}$ d. $\left\{\dfrac{\pi}{6},\dfrac{\pi}{2},\dfrac{5\pi}{6},\dfrac{3\pi}{2}\right\}$ e. NOTA

14. Which statement is **false**?

a. $3\sin 4x=6\sin 2x\cos 2x$ b. $\sin^2 3x-\cos^2 3x=-\cos 6x$

c. $\cos(2x+y)=\cos 2x\cos y+\sin 2x\sin y$ d. $1+\tan^2(100z)=\sec^2(100z)$

e. NOTA

15. Which of the following equations represents the *xy*-axes relative to the $x'y'-$axes on the graph of $xy=2$?

a. $x'=\dfrac{\sqrt{2}}{2}x-\dfrac{\sqrt{2}}{2}y$ b. $x'=\dfrac{\sqrt{2}}{2}x+\dfrac{\sqrt{2}}{2}y$ c. $x'=\dfrac{1}{2}x-\dfrac{\sqrt{3}}{2}y$ d. $x'=\dfrac{\sqrt{3}}{2}x+\dfrac{1}{2}y$ e. NOTA

16. Find the distance between $(5,315^\circ)$ *and* $(2,45^\circ)$.

a. $3\sqrt{2}$ b. $\sqrt{21}$ c. $\sqrt{29}$ d. $\sqrt{39}$ e. NOTA

17. Find the x value(s) of the point(s) of intersection graphs $y = 2+\sin x$ and $y = 3-\sin x$ when $x \in [0, 2\pi)$.

a. $x = \frac{\pi}{2}$ b. $x = \frac{\pi}{6}, x = \frac{5\pi}{6}$ c. $x = \frac{\pi}{3}, x = \frac{2\pi}{3}$ d. $\varnothing$ e. NOTA

18. Which describes the graph of the parametric equations? $\begin{aligned} x &= 4\tan\theta \\ y &= 5\sec\theta \end{aligned}$

a. Circle b. Parabola c. Ellipse d. Hyperbola e. NOTA

19. Identify the damping function of the graph $f(x) = \log x \sin\left(\frac{x}{2}\right)$.

a. $y = \log x$ b. $y = \sin x$ c. $y = \sin\left(\frac{x}{2}\right)$ d. $y = \frac{x}{2}$ e. NOTA

20. Given $\cos u = -\frac{4}{7}$, find $\cos 2u$. (Assume $\pi < u < \frac{3\pi}{2}$.)

a. $\frac{49}{33}$ b. $-\frac{17}{49}$ c. $-\frac{8\sqrt{33}}{49}$ d. $-\frac{33}{49}$ e. NOTA

21. Which expressions are equivalent?

I. $-\tan\left(\frac{\pi}{2}-\theta\right)$ II. $\tan\left(\theta-\frac{\pi}{2}\right)$ III. $\tan\left(-\left(\frac{\pi}{2}-\theta\right)\right)$

a. I and II only b. I and III only c. II and III only d. I, II, and III e. NOTA

22. Over $(0,2\pi)$ give the least two values of x which make $\cos x-\cos 2x=2\cos x$ true.

a. $\frac{\pi}{3},\frac{5\pi}{3}$ b. $0,\frac{\pi}{3}$ c. $\frac{\pi}{3},\pi$ d. $0,\frac{\pi}{6}$ e. NOTA

23. Simplify: $\left(6e^{i\left(\frac{4\pi}{3}\right)}\right)^2$

a. $-18+9i\sqrt{3}$ b. $36-9i\sqrt{3}$ c. $18-9i\sqrt{3}$ d. $-18+18i\sqrt{3}$ e. NOTA

24. How many petals does the rose curve have? $r=4\cos 8\theta$

a. 4 b. 8 c. 16 d. 32 e. NOTA

25. What does $\cos(\theta)$ equal if θ is the acute angle between the vectors <5,2> and <-1,4>?

a. $\frac{3\sqrt{493}}{493}$ b. $\frac{-13\sqrt{493}}{493}$ c. $\frac{6\sqrt{17}}{17}$ d. $\frac{-13\sqrt{17}}{17}$ e. NOTA

26. The equation $r=1-2\sin\theta$ when graphed is a

a. dimpled limacon b. cardioid c. inner loop limacon d. convex limacon e. NOTA

27. The vector $\langle -12,12 \rangle$ written in the trigonometric form of a complex number is

a. $12\sqrt{2}cis\frac{\pi}{4}$ b. $12\sqrt{2}cis\frac{17\pi}{4}$ c. $12\sqrt{2}cis\frac{15\pi}{4}$ d. $12\sqrt{2}cis\frac{3\pi}{4}$ e. NOTA

28. Which is **not** a fourth root of $81e^{i\frac{\pi}{3}}$?

a. $3cis\frac{\pi}{12}$ b. $3cis\frac{7\pi}{12}$ c. $3cis\frac{13\pi}{12}$ d. $2cis\frac{19\pi}{12}$ e. NOTA

29. Which of the following equations represents the asymptotes of $y = -2\tan\left(x - \frac{\pi}{3}\right)$?

(*n* represents the set of all integers)

a. $x = \frac{\pi}{2}n$ b. $x = \frac{5\pi}{6} + \pi n$ c. $x = \frac{\pi}{6} + \pi n$ d. $x = \frac{2\pi}{3} + \pi n$ e. NOTA

30. Evaluate: $\lim_{x\to 0}\frac{\sin 2x}{\sin x}$

a. 0 b. 1 c. 2 d. the limit does not exist e. NOTA