

NOTA means None Of The Above.

- Find the sum of all possible values of  $x$  if  $0 \leq x \leq \pi$  and if  $\sin^2 2x + \cos^2 x = 1$ .
  - $\frac{\pi}{3}$
  - $\pi$
  - $\frac{4\pi}{3}$
  - $2\pi$
  - NOTA
- A line  $\ell$  is perpendicular to the line  $2y - 3x = 12$  at its  $y$ -intercept. Find the  $x$ -intercept of  $\ell$ .
  - $(-7, 0)$
  - $(9, 0)$
  - $(6, 0)$
  - $(-6, 0)$
  - NOTA
- The sum of all solutions to  $x + 4 = \sqrt{16 + x}$  is:
  - 4
  - 16
  - 0
  - 8
  - NOTA
- The sum of the digits of a three-digit number is 6. The units digit is the sum of the other two. If the last two digits are interchanged we get a number that is 9 more than the original number. Find the original number.
  - 321
  - 132
  - 213
  - 420
  - NOTA

5. Find the numerical coefficient of the 6th term in the expansion of  $(2x^2 + 3y)^{11}$ .

- A. 14255
- B. 15552
- C. 12555
- D. 25551
- E. NOTA

6. Find the sum of the real solutions for  $x^5 + 3x^4 - 3x^3 - 9x^2 - 4x - 12 = 0$

- A. 3
- B. 2
- C. 0
- D. -3
- E. NOTA

7. Evaluate:  $(-3 + 3i)^6$ .

- A.  $3258i$
- B.  $-3258i$
- C.  $5832i$
- D.  $-5832i$
- E. NOTA

8. Solve for  $x$ , if  $0 \leq x \leq 360^\circ$  and  $\cot^2 x + \csc x + 1 = 0$ .

- A.  $120^\circ$
- B.  $60^\circ$
- C.  $180^\circ$
- D.  $270^\circ$
- E. NOTA

9. Find  $\tan 3x$  if  $\sin x = \frac{4}{5}$  and  $\frac{\pi}{2} < x < \pi$ .

A.  $\frac{44}{13}$

B.  $\frac{1}{44}$

C.  $-\frac{44}{13}$

D.  $-\frac{1}{44}$

E. NOTA

10. All of the following angles in standard position are coterminal with the angle of  $-400^\circ$  **except**:

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

B.  $320^\circ$

C.  $-40^\circ$

D.  $40^\circ$

E. NOTA

11. The sum of the roots of  $\frac{3}{x+2} + \frac{12}{x^2-4} = \frac{x}{x-2}$  is

A. 1

B. 3

C. -1

D. 5

E. NOTA

12. One of the roots of  $x^5 - 9x^4 + 5x^3 + 73x^2 - 20x - 350 = 0$  is  $3 - i$ . What is the sum of all the **real roots**?

- A.  $-3$
- B.  $6$
- C.  $3$
- D.  $9$
- E. NOTA

13. If  $\sin x = 7 \cos x$ , then the numerical value of  $\sin 2x$  is

- A.  $\frac{7}{50}$
- B.  $\frac{7\sqrt{2}}{10}$
- C.  $\frac{7\sqrt{2}}{5}$
- D.  $\frac{7}{25}$
- E. NOTA

14. A and B are two  $n \times n$  matrices. Which of the following **must** be true?

(NOTE:  $A^T$  and  $B^T$  are the transpose of A and B, respectively.)

- I.  $(AB)^T = B^T A^T$
- II.  $AB = BA$
- III.  $(A + B)^T = A^T + B^T$
- IV.  $(A - B)^2 = A^2 - 2AB + B^2$

- A. I and III only
- B. II and III only
- C. I, II, and III only
- D. all are true
- E. NOTA

15. If  $x + y = 6$  and  $xy = 15$ , then  $x^3 + y^3 = ?$

- A. 94
- B. -94
- C. -54
- D. 90
- E. NOTA

16. Simplify: 
$$\frac{2(5^{x+1}) + 7(5^{x-3})}{6(5^{x-2})}$$

- A. 41.9
- B. 25
- C. 125.6
- D. 1.5
- E. NOTA

17. The sides of a triangle are three consecutive whole numbers. If the numerical value of the area of the triangle is twice the numerical value of its perimeter, then what is the sum of the digits in the area measure?

- A. 6
- B. 8
- C. 10
- D. 12
- E. NOTA

18. Which of the given vectors is perpendicular to both vectors  $(-2, 3, 1)$  and  $(4, 1, -3)$ ?

- A.  $(5, 2, 4)$
- B.  $(-10, 2, -14)$
- C.  $(5, 1, 7)$
- D.  $(-9, -10, 12)$
- E. NOTA

19. Find the area of a triangle whose vertices are  $(1, 4)$ ,  $(8, 8)$ , and  $(3, 10)$ .

- A. 34
- B. 71
- C. 43
- D. 18
- E. NOTA

20. Simplify:

$$\frac{\sec^2 x - (\tan^2 x - \sin^2 x - \cos^2 x)}{\sin^2 x \tan x + \tan x + \tan x \cos^2 x}$$

- A.  $\tan x + 1$
- B.  $\frac{\tan x + 1}{\tan x}$
- C.  $\cot x$
- D.  $\sin^2 x + \tan x$
- E. NOTA

21. Given:  $\begin{cases} \frac{4x + 3y}{xy} = 5 \\ \frac{3x - 8y}{xy} = -\frac{13}{2} \end{cases}$ , then  $x + y = ?$

- A. 3
- B.  $\frac{11}{3}$
- C.  $\frac{7}{2}$
- D.  $\frac{9}{2}$
- E. NOTA

22. If  $5^x = 3^{2x+1}$  and  $\ln 3 = a$ ,  $\ln 5 = b$ , then  $x =$

- A.  $\frac{2b}{a}$
- B.  $\frac{a}{2b}$
- C.  $\frac{a}{b - 2a}$
- D.  $\frac{b}{a - 2b}$
- E. NOTA

23. Evaluate the sum:  $\sum_{j=0}^{10} \binom{10}{j} 2^j$

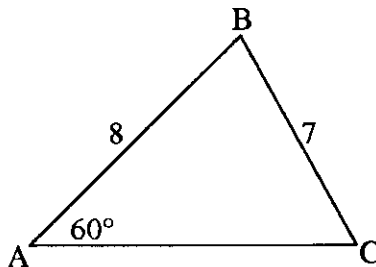
- A. 59049
- B. 2048
- C. 1048576
- D. 2187
- E. NOTA

24. If  $A$  is a  $2 \times 2$  matrix and  $\det A = 10$ , then  $\det A^{-1} = ?$

- A. 10
- B. 0.10
- C. 100
- D. 0.01
- E. NOTA

25. If in  $\Delta ABC$  shown below,  $m \angle A = 60^\circ$ ;  $AB = 8$ ;  $BC = 7$ , then  $AC$  could equal

- A. 1
- B. 2
- C. 4
- D. 5
- E. NOTA



26. The relation  $f(x) = \frac{x^3 + 4x^2 + x - 6}{x - 1}$  has a point of discontinuity at

- A.  $(-3, 0)$
- B.  $(-2, 0)$
- C.  $(0, 12)$
- D.  $(1, 12)$
- E. NOTA

27. Evaluate:  $\lim_{x \rightarrow 2} \frac{x^3 - 8}{2 - x}$

- A.  $-4$
- B.  $-12$
- C.  $10$
- D.  $12$
- E. NOTA

28. Find all asymptotes for  $f(x) = \frac{x^2 + 10x + 21}{x^2 + 2x - 35}$ .

- A.  $x = -5$  ;  $x = 7$
- B.  $x = 5$  ;  $y = 1$
- C.  $x = -5$  ;  $y = -1$
- D.  $x = 5$  ;  $x = -7$
- E. NOTA

29. If  $\begin{vmatrix} x & 3 & 4 \\ 9 & x & 3 \\ 1 & x & x \end{vmatrix} = 24$ , then  $x = ?$

- A.  $5$
- B.  $-5$
- C.  $-3$
- D.  $3$
- E. NOTA



30. A  $10 \times 10$  diagonal matrix has the following entries along its diagonal:

$$a_{11} = 1; a_{22} = -2; a_{33} = 3; a_{44} = -4; a_{55} = 5; a_{66} = -6; \dots; a_{1010} = -10$$

Then the value its determinant is:

- A. -5
- B. 5
- C. 3628800
- D. -3628800
- E. NOTA