

PRE-CALCULUS INDIVIDUAL TEST – WANDO MATH TOURNAMENT 2010

Note – NOTA (choice E) means none of the answers are correct

1) Identify the conic $4x - 3x^2 + 2 - 5y - 10y^2 = -20$

- A) Parabola B) Circle C) Ellipse D) Hyperbola E) NOTA

2) Evaluate $\arcsin(\sin \frac{5\pi}{6})$

- A) $\frac{5\pi}{6}$ B) $\frac{\pi}{6}$ C) $-\frac{5\pi}{6}$ D) $-\frac{\pi}{6}$ E) NOTA

3) Given $f(x) = \lceil x \rceil$, find $f(e)$

- A) 2.71 B) 2 C) e D) 3 E) NOTA

4) Find the sum of the solutions of $x^4 + x^3 - 2x^2 + 4x - 24 = 0$

- A) 0 B) 1 C) 2 D) 3 E) NOTA

5) How many asymptotes does the following rational graph have? $f(x) = \frac{7x^3 + 5x - 4}{10x^2 + 3x - 1}$

- A) 0 B) 1 C) 2 D) 3 E) NOTA

6) Evaluate $\sin(\cos^{-1} \frac{3}{5} + \tan^{-1} \frac{12}{5})$

- A) $\frac{56}{65}$ B) $\frac{16}{65}$ C) $\frac{63}{65}$ D) $\frac{33}{65}$ E) NOTA

7) Simplify $\log_4 8 \bullet \log_6 3 \bullet \log_7 4 \bullet \log_3 5 \bullet \log_2 7 \bullet \log_5 6$

- A) 1 B) 2 C) 3 D) 8 E) NOTA

8) Evaluate $\sqrt{-50}\sqrt{-2}$

- A) 10 B) $10i$ C) -10 D) $-10i$ E) NOTA

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9) Find the domain of: $f(x) = \frac{1}{\sqrt{x^2 + 4x}}$

- A) $(-\infty, -4) \cup (0, \infty)$ B) $[-4, 0]$ C) $(-4, 0)$ D) $(-\infty, -4] \cup [0, \infty)$ E) NOTA

10) Simplify: $i^{2010}(i^{2009} - i^{2008})$ where $i = \sqrt{-1}$

- A) $i-1$ B) $i+1$ C) $-i-1$ D) $-i+1$ E) NOTA

11) Find all values of x such that $\sqrt{9x^2} = 3x$ is true

- A) All reals B) $[0, \infty)$ C) 1 D) $(-\infty, 0]$ E) NOTA

12) Find the remainder when $x^{2010} + 5x^{2009} - 25x^{2006} + x^{2008} + x + 2010$ is \div by $x + 5$

- A) 2008 B) 2007 C) 2006 D) 2005 E) NOTA

13) Define $g(x) = \begin{cases} -2x-7 & x < 0 \\ -1 & x = 0 \\ -x+2 & x > 0 \end{cases}$, find $g(g(g(g(g(0)))))$

- A) 3 B) -5 C) 0 D) -1 E) NOTA

14) Let $f(x) = ax^6 + bx^5 + cx^3 + dx + g$, where $a, b, c, d, g \in \{\text{Real Numbers}\}$, with $3+i$ a complex root. Which of the following **must** be true:

- I. $3-i$ is a root
- II. $\frac{g}{a}$ is a possible root
- III. The function has at most four unique real solutions

- A) All are true B) I only C) II only D) I and II E) NOTA

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15) Evaluate $\sum_{n=0}^{\infty} \frac{(-1)^n (\log_{2010} 2)^n}{n! (\log_{2010} e)^n}$ HINT: Remember that $\sum_{n=0}^{\infty} \frac{x^n}{n!} = e^x$ for all real x

- A) $\frac{1}{2}$ B) 2 C) 2010 D) e E) NOTA

16) Find $\cos(A) + \cos(B)$ of a triangle with sides of length $a = 3, b = 4, c = 6$

- A) 1.5 B) $\frac{245}{144}$ C) $\frac{7}{6}$ D) $\frac{6}{7}$ E) NOTA

17) Simplify $\frac{\sin^4 \theta - \cos^4 \theta}{\cos(2\theta)}$

- A) -1 B) $\sec(2\theta)$ C) 1 D) $\frac{\sin^2 \theta - \cos^2 \theta}{2 \sin \theta \cos \theta}$ E) NOTA

18) Find the period of the following trigonometric function: $y = -3 \cot\left(\frac{4x}{\pi} - 3\right) + 1$

- A) $\frac{\pi^2}{2}$ B) $\frac{\pi}{2}$ C) $\frac{1}{2}$ D) $\frac{\pi}{3}$ E) NOTA

19) $\cos(\sin^{-1}(\tan(\cos^{-1}(\sin\left(\frac{-\pi}{4}\right))))$

- A) $\frac{-\sqrt{2}}{2}$ B) $\frac{\sqrt{2}}{2}$ C) 0 D) undefined E) NOTA

20) Change the following parametric equation into rectangular form: $x = \sec t$
 $y = \tan t$

- A) $x^2 - y^2 = 1$ B) $x^2 + y^2 = -1$ C) $-x^2 + y^2 = 1$ D) $x^2 + y^2 = 1$ E) NOTA

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21) Find the dot product of \vec{u} and \vec{v} if $\vec{u} = \langle 3, -1, 2 \rangle$ and $\vec{v} = \langle 1, 1, -1 \rangle$

- A) 0 B) 6 C) 14 D) $\sqrt{14}$ E) NOTA

22) If $x^y = \frac{3}{2}$ find $(x^{-2})^{2y}$

- A) $\frac{4}{9}$ B) $\frac{9}{4}$ C) $\frac{81}{16}$ D) $\frac{16}{81}$ E) NOTA

23) Solve the equation: $\sin \theta \cos \theta = \frac{-1}{2}$, $0 \leq \theta \leq 2\pi$

- A) $\frac{\pi}{4}, \frac{5\pi}{4}$ B) $\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$ C) $\frac{\pi}{4}$ D) $\frac{3\pi}{4}, \frac{7\pi}{4}$ E) NOTA

24) What is the product of the period and the amplitude of this graph: $y = 4 \sin\left(\frac{5\pi}{2}x - 3\right) - 2$

- A) 5 B) $\frac{4}{5}$ C) 5π D) $\frac{8}{5\pi}$ E) NOTA

25) Find the reference angle for -2310°

- A) 30° B) 60° C) 90° D) 150° E) NOTA