

ALGEBRA II INDIVIDUAL TEST – WANDO MATH TOURNAMENT

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

- 1) What is the remainder when  $2x^3 - 3x^2 - 16x + 50$  is divided by  $(-3 + 2x)$
- A) 0                      B) 26                      C) 50                      D) 74                      E) NOTA
- 2) Simplify:  $\frac{x^{1/2} - x^{-1/2}}{3^{-1}x^{-1/2}}$  (note:  $x > 0$ )
- A)  $\frac{x-1}{3}$                       B)  $3\sqrt{x}$                       C)  $\frac{\sqrt{x}}{-3}$                       D)  $3x - 3$                       E) NOTA
- 3) Suppose  $A = \begin{bmatrix} -3 & 3 & 1 \\ 2 & 0 & 4 \end{bmatrix}$  and  $B = \begin{bmatrix} 2 & 0 \\ 1 & -3 \\ -1 & 4 \end{bmatrix}$ . Find the element in row 2, column 2 of  $(AB)^{-1}$
- A)  $\frac{1}{16}$                       B) 16                      C) 15                      D)  $\frac{1}{15}$                       E) NOTA
- 4) Find x such that  $\left(\frac{2x+1}{x}\right)^2 - \frac{2x+1}{x} = 2$
- A)  $\emptyset$                       B) -1                      C)  $\frac{-1}{4}$                       D)  $\frac{-1}{3}$                       E) NOTA
- 5) Simplify  $\frac{\left(\frac{x^2-4}{x^2-5x+6}\right)}{\left(\frac{x^2+4x+4}{x^2-4x+3}\right)}$  (note:  $x \notin \{-2,1,2,3\}$ )
- A)  $\frac{x+2}{x-1}$                       B)  $\frac{x-1}{x+2}$                       C)  $\frac{x+2}{x-3}$                       D)  $\frac{x-3}{x+2}$                       E) NOTA
- 6)  $\sqrt{42 - \sqrt{42 - \sqrt{42 - \dots}}} = N$ . Find the value of N
- A) 5                      B) 6                      C) 7                      D)  $\sqrt{42}$                       E) NOTA
- 7)  $\sum_{k=1}^{\infty} 2\left(\frac{1}{3}\right)^{(k-1)} = ?$
- A) 1                      B) 2                      C) 3                      D) 4                      E) NOTA

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8) Suppose  $y$  varies jointly as  $x$  and  $z$  while it varies inversely as  $u$ . If  $y = 6$  when  $x = 2$ ,  $z = 3$ , and  $u = 4$ , then find  $y$  when  $x = 4$ ,  $z = 3$ , and  $u = 8$ .

- A) 6                      B)  $\frac{3}{8}$                       C) 24                      D) 4                      E) NOTA

9) Find the sum of the values of  $k$  that make  $-3$  a root of  $P(x) = x^4 - kx^3 + k^2x - 6$  (Note: the  $k^2$  is **not** a typo)

- A)  $-3$                       B)  $9$                       C)  $-9$                       D)  $3$                       E) NOTA

10) Laura invested some money in Stock A and Stock B. Last year she received a dividend of \$120 from Stock A and received an 8% return on her investment on Stock B. Her total earnings from the two stocks was \$580. How much money did Laura invest in Stock B?

- A) \$5750                      B) \$575                      C) \$7130                      D) \$7250                      E) NOTA

11) Consider the following equation:  $y^2 + 8x - 6y + 25 = 0$ . What is the x-coordinate of the vertex of the parabola?

- A) 3                      B)  $-2$                       C) 2                      D)  $-3$                       E) NOTA

12) For what value of  $k$  will the graph of  $6x + ky = 12$  be perpendicular to the graph of  $3x - 5y = 10$ ?

- A) 10                      B)  $-10$                       C)  $\frac{18}{5}$                       D)  $\frac{-5}{18}$                       E) NOTA

13)  $(3 - i)^3 = ?$  (Note:  $i = \sqrt{-1}$ )

- A)  $30 + 10i$                       B)  $8 - 6i$                       C)  $9 - 3i$                       D)  $18 - 26i$                       E) NOTA

14) Given:  $f(x) = x^2 - 8x + k$ . Suppose the minimum value of the function is  $-12$ . What is the value of  $k$ ?

- A) 4                      B)  $-60$                       C)  $-4$                       D)  $-12$                       E) NOTA

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15) Determine the sum of A, B, and C so that the graph of  $Ax + By = C$  will contain the points  $(-2, 3)$  and  $(1, 4)$ .  
Note that A, B, and C are relatively prime integers and  $A > 0$ .

- A) -13                  B) -7                          C) 15                          D) -15                          E) NOTA

16) If  $f(x) = \frac{1}{2x-3}$  then  $f^{-1}(x) = ?$

- A) 2                          B)  $\frac{6x+1}{2x}$                           C)  $\frac{3x+1}{2x}$                           D)  $\frac{x+3}{6x}$                           E) NOTA

17) Give the solution for x in interval notation:  $\frac{6}{x-5} < x$

- A)  $(-1, 6)$                   B)  $(-1, 5) \cup (6, \infty)$                   C)  $(-1, 6) \cup (6, \infty)$                   D)  $(-1, 5) \cup (5, \infty)$                   E) NOTA

18) A 60% salt solution and an 80% salt solution are combined to form 35 mL of a 72% salt solution. How many mL of the 60% salt solution are needed for the mixture?

- A) 11.9 mL                  B) 21 mL                          C) 14 mL                          D) 23.1 mL                          E) NOTA

19) Consider the equation  $2(x+2)^{\frac{2}{3}} = 162$ . Solve over the set of real numbers. What is the sum of the solutions?

- A) -4                          B) 727                          C) 1458                          D) 0                          E) NOTA

20) Solve for x in the following equation:  $4x^2 + 9 = 0$  where  $x \in \mathbb{R}$

- A)  $\frac{3}{2}, \frac{-3}{2}$                           B)  $\frac{9}{4}$                           C)  $\frac{3}{2}i, \frac{-3}{2}i$                           D)  $\pm \frac{9}{4}i$                           E) NOTA

21) What is the remainder when  $2008x^8 - 2007x^7 + 2006x^6 - 2005$  is divided by  $x+1$ ?

- A) 2                          B) 4016                          C) 8026                          D) 46424                          E) NOTA

22) Find the midpoint of the line segment with endpoints  $(-2, 9)$  and  $(-10, -1)$

- A)  $(4, 4)$                           B)  $(4, 5)$                           C)  $(-6, 5)$                           D)  $(-6, 4)$                           E) NOTA

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23) Find  $i^{2008}$

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

24) Let the discriminant of a quadratic equation of form  $ax^2 + bx + c = 0$  be 16. What can you say about the nature of the roots of this equation?

- A) The quadratic has 2 negative real roots                      B) The quadratic has a positive y-intercept  
C) The quadratic opens upward                      D) The quadratic has rational roots  
E) NOTA

25) Find the coefficient of the 4<sup>th</sup> term in the expansion of  $(x+2)^7$

- A) 280                      B) 16                      C) 120                      D) 360                      E) NOTA