Algebra 2 Individual Test –Wando High School 4th Annual Tournament 2009

Note: "NOTA" means "None Of These Answers" is correct.

1. Give the solution for x in interval notation: $\frac{6}{x-1} < x$

   A) $-2,\infty$ B) $-\infty,-2 \cup 1,3$ C) $3,\infty$ D) $(-2,1) \cup 3,\infty$ E) NOTA

2. Solve for x: $y = \frac{3x+2}{4-x}$

   A) $\frac{5y-2}{3}$ B) $\frac{4y+2}{y-3}$ C) $\frac{4y-2}{y+3}$ D) $\frac{-4y+2}{y-3}$ E) NOTA

3. A 10 L container contains a 50% fruit juice solution. How much must be withdrawn and replaced by 100% fruit juice to bring the concentration up to 60%?

   A) 0.5 L B) 1.5 L C) 2.5 L D) 3.5 L E) NOTA

4. If $f(x) = \sqrt{x+5}$ and $g(x) = x^2 + 4$, find $f\ g\ x$

   A) $\sqrt{x^2+9}$ B) $x+3$ C) $x+9$ D) $\sqrt{x^3+5x^2+4x+9}$

5. Simplify: $\left[\left(\frac{-7x}{x^3-27}\right)\left(\frac{2x^2+7x+5}{2x^2-x-15}\right)^{-1} + \left(\frac{x+9}{x^2+3x+9}\right)\right]^{-1}$ (You may assume no denominator is equal to zero.)

   A) 1 B) x C) x + 1 D) $\frac{1}{x+1}$ E) NOTA

6. Evaluate $\sum_{n=1}^{\infty} 16\left(\frac{1}{2}\right)^{n-1}$

   A) 16 B) 64 C) 32 D) 8 E) NOTA

7. Given that the graph of one-to-one function f(x) contains the coordinate points $(1,0),(2,3),(3,5),(4,1),(5,2)$ and it is known that for one-to-one function g(x), g(1)=3, g(2)=5, g(3)=2, g(4)=6, and g(5)=4, find the value of $f\ g^{-1}\ f\ g^{-1}(5)$

   A) 12 B) 0 C) 1 D) 9 E) NOTA

8. Simplify $(1-i)^2+(1+i)^2$ where $i=\sqrt{-1}$

A) 0 B) 1 C) -1 D) 4i E) NOTA

9. The graphs of $y=x^2$ and $y=2^x$ intersect at exactly how many points?

A) 0 B) 1 C) 2 D) 4 E) NOTA

10. For each of the following statements that are true, assign it a value of 1. For each of the following statements that are false, assign it a value of -1. Find the sum of the values assigned to the statements.

I) The degree of a polynomial is equivalent to the sum of its real and imaginary roots.
II) For an even-degree polynomial **f(x)** with a positive leading coefficient, $\lim_{x\to\infty} f(x)=\infty$.
III) Every odd-degree polynomial is guaranteed at least 1 real x-intercept.
IV) For a quadratic polynomial **g(x)** with discriminate equal to 0, there exist exactly 2 distinct real roots.

A) 0 B) 2 C) -2 D) 4 E) NOTA

11. Mrs. Gmuer has 2 sections of Honors Algebra 2. The first class has 25 students and a class mean of 88. The second class has 30 students and a class mean of 92. What is the combined mean (to the nearest tenth) for Mrs. Gmuer's two classes?

A) 71.6 B) 90.2 C) 92.2 D) 89.8 E) NOTA

12. Find the sum of the solutions for x to the equation $2\sqrt{x+2\sqrt{x+2\sqrt{x+2\sqrt{x+2...}}}}=x$.

A) 0 B) 2 C) 4 D) 8 E) NOTA

13. What is the description of the locus of points on a plane described by $-x^2+4x-7=-y^2+6y$

A) parabola B) ellipse C) circle D) hyperbola E) NOTA

14. Given that $a\otimes b=\ b-2\ \frac{a\otimes(b-1)}{2}$ find $7\otimes 5$ given that $7\otimes 2=16$

A) 12 B) 16 C) 8 D) 48 E) NOTA

15. Simplify: $\log_{64}27\cdot\log_{27}13\cdot\log_{13}4$

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

16. Find the positive value of x such that $\begin{bmatrix} x+2 & -6 \\ -4 & x \end{bmatrix}$ does not have an inverse.

A) 2 B) 3 C) 4 D) 6 E) NOTA

17. Find the product of all x and y intercepts for the conic section $x-2\,^{2}+\ y+3\,^{2}=16$

A) 9 B) -9 C) 0 D) $36+2\sqrt{21}$ E) NOTA

18. Which of the following expressions has a value different than the other four expressions?

A) $\left(\frac{1}{32}\right)^{-5000}$ B) $\left(\frac{1}{8}\right)^{-1000}$ C) 8^{1000} D) 2^{3000} E) 4^{1500}

19. Find the value of i^{2009} where $i=\sqrt{-1}$.

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

20. For positive values of x, $f(x)=2f(x)+f(x-2)=4x$ and $f(0)$ is defined as 0. Find the value of $f(6)$.

A) 0 B) 6 C) 12 D) 24 E) NOTA

21. Find the sum of the following series: $\frac{1}{3}+\frac{2}{5}+\frac{1}{6}+\frac{2}{15}+\frac{1}{12}+\frac{2}{45}+...$

A) $\frac{6}{5}$ B) $\frac{19}{15}$ C) $\frac{209}{180}$ D) $\frac{13}{10}$ E) NOTA

22. Solve for x and find the sum of the solutions: $3^{2x}-(10)(3^{x})=-9$

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

23. Given that $f(x)=x^{2}+4x+2$ and $g(x)=x-2$, find the minimum value of the function $f(g(x))$.

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

24. The harmonic mean, H, of two numbers A and B, can be found by the formula H = $\frac{1}{A}+\frac{1}{B}$. If the harmonic mean between $\sqrt{2}$ and B is $\frac{\sqrt{2}}{2}+\frac{\sqrt{3}}{3}$, find the value of B^3.

A) 3 B) $\sqrt{3}$ C) $\sqrt[3]{3}$ D) $3\sqrt{3}$ E) NOTA

25. Solve the following equation for x: $\log_{1/8} x=-2$

A) -16 B) $\frac{1}{64}$ C) 16 D) 64 E) NOTA

Solutions:

1. D
2. C
3. E (2 L)
4. A
5. C
6. C
7. B
8. A
9. C
10. B
11. B
12. D
13. D
14. A
15. E (1/3)
16. C
17. A
18. A
19. C
20. E (9)
21. B
22. D
23. C
24. D
25. D