

Algebra II Individual Test

Let choice "E) NOTA" denote "None of the Above"

- 1) If $f(x) = 4x^2 + 6x - 3$, then $f(-5)$ equals
 A) -130 B) -1 C) 67 D) 103 E) NOTA
- 2) Given $(3 + i)^4 = a + bi$ and $i = \sqrt{-1}$, find $b - a$.
 A) -57 B) -8 C) 8 D) 68 E) NOTA
- 3) Given $(\log_2 x)^2 + \log_2(x^3) + \log_4 16 = 0$, what is the sum of all real values of x ?
 A) -3 B) $-\frac{1}{8}$ C) $\frac{1}{8}$ D) $\frac{3}{4}$ E) NOTA
- 4) Find the distance between the point $(2, -5)$ and the center of $4x^2 + 16x + 9y^2 - 54y + 61 = 0$.
 A) 4 B) 8 C) $\sqrt{74}$ D) $4\sqrt{5}$ E) NOTA
- 5) Steve wants to go to the Wonka convention 12 miles away but his car is broken. At 3 pm he decides to ride his bike and travels at a constant speed of 14 mph to the convention. After $\frac{2}{3}$ of his journey his bike tire pops, and he must walk the rest of the way. If the convention begins at 4:30 pm what is the minimum speed Steve must average as he walks if he wants to make it to the convention when it begins?
 A) 4 mph B) $\frac{56}{13}$ mph C) $\frac{112}{13}$ mph D) 16 mph E) NOTA
- 6) Given $\begin{vmatrix} -3 & 2 & 10 \\ 4 & -5 & x \\ x & 6 & 9 \end{vmatrix} = 175$, find the sum of all the solutions of x .
 A) -38 B) -30 C) 4 D) 34 E) NOTA

7) A pencil box with no top was made out of a 9 inch x 13 inch sheet of metal by cutting squares with an area of 4 square inches out of each corner. What is the longest pencil length that can fit inside the pencil box?

- A) 9 inches B) $\sqrt{42}$ inches
C) $\sqrt{110}$ inches D) $\sqrt{174}$ inches
E) NOTA

8) What is the coefficient of the term containing x^6 in the expansion of $(4x^2 - \frac{y}{2})^9$?

- A) -36 B) 84 C) 126 D) 5376 E) NOTA

9) Which of the following is the equation for the perpendicular bisector of the line segment connecting the points (4,2) and (-3, -5)?

- A) $y = -\frac{5}{9}x - \frac{11}{9}$ B) $y = -\frac{9}{5}x - \frac{3}{5}$
C) $y = -x - 1$ D) $y = -x - 2$
E) NOTA

10) If each of the 5 Backstreet Boys pick one person at random from an audience of 428 girls and 19 boys, what is the percent probability, to 2 significant digits, that the lucky chosen group will consist of exactly 4 girls and 1 boy?

- A) 0.92% B) 8.3% C) 18% D) 20% E) NOTA

11) What is the area of the graph enclosed by $y = |x - 2.5|$, $x = 0$, and $y = 0$?

- A) 3.125 B) 3.5 C) 6.25 D) 12.25 E) NOTA

12) If the 1st term of a geometric series is 54054 and the 4th term is 2002, what is the 9th term, rounded to 4 significant digits?

- A) 2.746 B) 3.345 C) 8.239 D) 24.72 E) NOTA

13) The letter A for Arum is drawn on a piece of graph paper in the shape of a parabola. The base of the letter is 6 cm wide, the height is 9 cm, and the horizontal line segment whose end points lie on the parabola creating the A is $2\sqrt{5}$ cm wide. How far in cm is the top of the A from the center of the horizontal line segment?

- A) 5 cm B) $\sqrt{30}$ cm C) 6 cm D) 6.5 cm E) NOTA

14) Which of the following is equivalent to $\frac{2x^2 + 6x - 5}{x^2 + 4x + 3}$?

A) $-\frac{9}{2x+2} + \frac{5}{2x+6}$

B) $\frac{4}{x+1} + \frac{2}{x+3}$

C) $\frac{4}{x+1} - \frac{x}{x+3}$

D) $\frac{9}{2x+1} - \frac{5}{2x+3}$

E) NOTA

15) Evaluate $\sum_{n=1}^{\infty} 5 \cdot \frac{1}{2^n}$

A) 2.5

B) 4

C) 4.9

D) 5

E) NOTA

16) Which of the following points is a focus of the ellipse $25x^2 + 9y^2 - 200x + 18y + 184 = 0$?

A) (-4,3)

B) (0, 4)

C) (3,4)

D) (4,4)

E)NOTA

17) Simplify $\frac{(n+1)!}{(n-1)!}$

A) n

B) n - 1

C) $\frac{n+1}{n}$

D) $n^2 + n$

E) NOTA

18) If n is a positive integer and the remainder when $4x^{n+3} + 3x^{n+2} - x^n + 89$ is divided by $x + 2$ is 5, what is the value of n?

A) 1

B) 2

C) 3

D) 4

E) NOTA

19) Sarah's little brother wants to borrow \$25 from Sarah. She makes him the following deal; he can either borrow the \$25 now and pay back the full amount with 6% interest per day compounded daily, or he can borrow \$25 and payback the \$25 plus an additional amount of \$5 for everyday he does not return the money, not including today. For example the next day he would owe Sarah \$26.50 with deal one or \$30 with deal two. After how many days will the amount owed with deal one exceed the amount owed with deal two?

A) 37 days

B) 40 days

C) 375 days

D) 424 days

E) NOTA

- 20) Which of the following is the point of inflection for $3x^3 + 9x^2 + x + 5 = 0$?
- A) (-3,2) B) (-1,10) C) (0,5) D) (1,18) E) NOTA

- 21) Consider the graph of $f(x) = \frac{x^2 + 3x - 5}{x + 2}$. Which of the following statements are true?

- I. There are exactly 2 asymptotes
 II. The range of the function is all real numbers
 III. A removable discontinuity exists when x is -2

- A) I only B) II only C) I and II only D) II and III only E) NOTA

- 22) Simplify $\sqrt{6 - \sqrt{6 - \sqrt{6 - \sqrt{6 - \dots}}}}$

- A) 1.8 B) 2 C) $\sqrt{6}$ D) -3 E) NOTA

- 23) The expression $\frac{3x^6y^{-3}z^{-1}}{39x^0y^{-5}z^4}$ is equivalent to

- A) $13x^6y^2z^5$ B) $\frac{y^3z^8}{13}$ C) $\frac{x^6z^3}{9y^8}$ D) $\frac{x^6y^3}{13z^3}$ E) NOTA

- 24) At Tom's Trophy store the cost of a 6-inch tall trophy is \$26, the cost of an 8-inch tall trophy is \$48, and the cost of a 15-inch tall trophy is \$188. Assuming the cost of a trophy is a quadratic function of the height of the trophy, what is the cost of a 12-inch trophy?

- A) \$116 B) \$120 C) \$138 D) \$150 E) NOTA

- 25) If $f(x) = x^2 + 2x + 3$, $g(x) = x - 6$, and $h(x) = 5x - 11$, find $g^{-1}(f(3) + h^{-1}(-1))$.

- A) -4 B) 8 C) 14 D) 26 E) NOTA

- 26) Put the following circles in order of greatest area to smallest area:

- I. $x^2 + y^2 - 10x + 8y + 5 = 0$
 II. $x^2 + y^2 - 6x - 4y - 12 = 0$
 III. $x^2 + y^2 - 8x + 6y - 56 = 0$
 IV. $x^2 + y^2 = 49$

- A) I, III, IV, II B) II, I, IV, III
 C) III, I, IV, II D) III, IV, I, II E) NOTA

27) On a certain difficult math problem it takes Arum 6 minutes to complete the problem. However it takes Steve 3 minutes to complete the same problem and Adam 4 minutes. How long would it take to complete the problem if all three worked together?

- A) $\frac{4}{3}$ mins B) 2 mins C) 4 mins D) $\frac{13}{3}$ mins E) NOTA

28) Given $y = ax^3 + bx^2 + cx + d$, and $r, s,$ and t are distinct solutions for x , find $r^2 + s^2 + t^2$.

- A) $\frac{b^2 - 4ac}{2a}$ B) $\frac{b^2 + 2ac}{a^2}$
C) $\frac{b^2 - 2ac}{a^2}$ D) $\frac{b^2 - 4ac}{c}$
E) NOTA

29) If the center of a sphere is located at the point (a,b,c) and the points $(0,0,0), (-5, -5, -2), (-4, 2, -8), (10, 10, 5)$ all lie on the sphere, what is $a + b + c$?

- A) 91.5 B) 92.5 C) 93.5 D) 94.5 E) NOTA

30) How many of the following could the graph $Ax^2 + By^2 + Cx + Dy + F = 0$, where A or C does not equal 0, be?

- I. Parabola
- II. Two parallel lines
- III. Circle
- IV. Hyperbola
- V. A point
- VI. Two Intersecting Lines
- VII. One Line
- VIII. Nothing (no solutions)

- A) 4 B) 5 C) 6 D) 8 E) NOTA