

Level 3 (Algebra II) Blitz – 2004

1. The y-intercept of  $y = 2(x - 3)^2 + 4$  is ...  
a) 3      b) 18      c) 22      d) none of these
2. The value of the determinant  $\begin{vmatrix} 3 & 1 \\ 2 & 3 \end{vmatrix}$  is ...  
a) 9      b) 11      c) 13      d) none of these
3. The solution to  $\frac{x}{x-1} \geq 2$  is ...  
a)  $(-1, 2)$     b)  $(-1, 2]$     c)  $(0, 2)$       d)  $(0, 2]$       e) none of these
4. The solution to  $|2x - 3| < 5$  is ...  
a)  $(-1, 4)$     b)  $[-1, 4]$     c)  $(1, 4)$       d)  $[1, 4]$       e) none of these
5. If  $x^2 + 10x + 25 = 0$ , then x is ...  
a) -5      b) 25      c) -25      d) none of these
6. All lines perpendicular to  $3x + 4y = 12$  have slope ...  
a)  $3/4$       b)  $4/3$       c)  $-3/4$       d)  $-4/3$       e) none of these
7. If  $\log(x) = 0.5$ , then x =  
a) 0.5      b) 5      c)  $\sqrt{10}$       d) 10      e) none of these
8.  $x^2 + 4x + 2y^2 + 3y - 17 = 0$  is the equation of a(n) .  
a) circle    b) ellipse    c) line      d) parabola    e) none of these
9. If  $f(x) = 2x - 4$ , then  $f^{-1}(x) =$   
a)  $2x + 4$     b)  $4x + 2$     c)  $2x - 4$     d)  $4x - 2$     e) none of these

10. Two widgets and a gadget cost a total of \$11. A widget and two gadgets cost a total of \$10. A single widget costs ...
- b) \$5      c) \$6      d) \$7      e) none of these
11. One solution to the system  $y = 2x + 5$  and  $y = x^2 + 2$  is
- a) (2, 5)      b) (0, 2)      c) (3, 9)      d) (3, 11)      e) none of these
12. A car can travel 60 miles in 60 minutes. How long would it take this car to travel 60 miles if it drove half as fast?
- a) 30 min.      b) 60 min.      c) 90 min.      d) 120 min.      e) none of these
13. The sum of the first 2004 natural numbers is ...
- a) 2,000,000      b) 2,008,008      c) 2,008,010      d) 2,009,010      e) none of these
14. One solution to  $x^2 + 4x + 2 = 0$  is ..
- a)  $-2 + \sqrt{2}$       b)  $2 + \sqrt{2}$       c)  $-4 + \sqrt{2}$       d)  $4 + \sqrt{2}$       e) none of these
15. The value of the infinite series  $1/2 - 1/4 + 1/8 - 1/16 + 1/32 \dots$  is ...
- a) 1/4      b) 1/3      c) 1/2      d) 1      e) none of these
16. If  $i = \sqrt{-1}$ , then  $(2 + i)^2$  is ...
- a)  $1 + 2i$       b)  $2 + i$       c)  $3 + 4i$       d)  $4 + 3i$       e) none of these
17. The value of the determinant  $\begin{vmatrix} 1 & 4 & 8 \\ 0 & -2 & 0 \\ 0 & 0 & 7 \end{vmatrix}$  is ..
- b) -14      c) 18      d) 32      e) none of these
18. If  $\log(x) + \log(x + 3) = 1$  then  $x =$
- a) -5      b) -2      c) 0      d) 5      e) none of these

19.  $\log(100) + \log(1) =$   
 b) 3            c) 101            d)  $\log(101)$     e) none of these
20. The radius of the circle  $x^2 - 8x + y^2 + 4y = 0$  is ..  
 b) 6            c) 8            d) 12            e) none of these
21.  $\frac{\log(8)}{\log(4)} =$   
 a)  $\log(2)$     b)  $\log(4)$     c)  $\log_4(8)$     d)  $\log_8(4)$     e) none of these
22. Let  $f(x) = x^2 - 4x + 3$ . The range of  $f(x)$  is ...  
 a)  $\{y \mid y > 1\}$     b)  $\{y \mid y \geq 1\}$     c)  $\{y \mid y > 3\}$     d)  $\{y \mid y \geq 3\}$     e) none of these
23. One solution to the system  $2x + 3y = 8$  and  $5x - y = 3$  is ..  
 a) (4, 0)    b) (0, -3)    c) (2, 7)    d) (1, 1)    e) none of these
24. The  $x^2$  term of  $(x + 2)^3$  is ..  
 a)  $2x^2$     b)  $3x^2$     c)  $4x^2$     d)  $6x^2$     e) none of these
25. If  $i = \sqrt{-1}$ , then  $i^{2004} =$   
 a) 1            b) -1            c)            d) -            e) none of these
26. A rectangle has perimeter 80 and length L. The area of this rectangle is  
 a) 6400    b) 80L    c)  $80L^2$     d)  $L(40 - L)$     e) none of these
27.  $\frac{1}{3 + \sqrt{2}} =$   
 a)  $\sqrt{2}$     b)  $3 + \sqrt{2}$     c)  $\frac{3 - \sqrt{2}}{7}$     d)  $\frac{3 + \sqrt{2}}{11}$     e) none of these

28. The ellipse  $25x^2 + 16y^2 = 400$  has a focus at ...  
a) (3, 0)      b) (0, 3)      c) (5, 0)      d) (0, 5)      e) none of these

29. If  $i = \sqrt{-1}$ , then  $\frac{1+2i}{3+4i} =$   
a)  $11 - 2i$       b)  $11 + 2i$       c)  $2 - 11i$       d)  $2 + 11i$       e) none of these

The maximum value of  $h(t) = -16t^2 + 64t + 8$  is ...

- a) 8              b) 72              c) 128              d) 136              e) none of these
31. Let  $f(x) = x + 3$  and  $g(x) = 2x - 1$ . Then  $(f + g)(x) =$

- a)  $x - 1$       b)  $2x - 3$       c)  $2x + 3$       d)  $3x + 2$       e) none of these

Let  $f(x) = 2x + 3$  and  $g(x) = x^2 - 1$ . Then  $f(g(x)) =$

- a)  $2x^2 - 1$       b)  $2x^2 + 1$       c)  $2x^2 + 3$       d)  $x^2 + 2x$       e) none of these

Let  $f(x) = \frac{x+4}{x-5}$ . The domain of  $f(x)$  is

- a)  $\{x \mid x > 5\}$       b)  $\{x \mid x \leq 5\}$       c)  $\{x \mid x > 4\}$       d)  $\{x \mid x \leq 4\}$       e) none of these

34. The real part of the roots of  $x^2 - 6x + 10 = 0$  is

- a) 3              b) -3              c) 6              d) -6              e) none of these

Let  $a_n = 10^{-n}$ . Then  $a_1 + a_2 + a_3 + a_4 + a_5 =$

- a) 0.111111      b) 0.11111      c) 0.1111      d)  $1/9$               e) none of these

36.  $\log(12) + \log(6) =$

- a) 18              b)  $\log(18)$       c)  $2\log(18)$       d)  $\log(72)$       e) none of these

The first two terms in an arithmetic sequence are 10 and 100. The third term is ...

- a) -90      b) 90      c) 190      d) 1000      e) none of these

38. Let  $f(x) = x^3 + x$ . Then  $f^{-1}(2) =$

- a) 0      b) 1      c) 2      d) 10      e) none of these

39.  $2004! = \dots$

- a) 0      b) 1      c) 2004      d) 4,016,016      e) none of these

40. A pair of fair six-sided dice is rolled. The probability that the sum of the dice is seven is ...

- a)  $1/2$       b)  $1/4$       c)  $1/6$       d)  $1/7$       e) none of these

41. A pair of fair six-sided dice is rolled. The probability both dice show the same number is ...

- a)  $1/2$       b)  $1/4$       c)  $1/6$       d)  $1/7$       e) none of these

A varies inversely with B.  $A = 6$  when  $B = 10$ . If  $A = 5$  then  $B =$

- a) 8      b) 9      c) 11      d) 12      e) none of these

43. The distance between (4, 7) and the origin is

- a) 11      b) 65      c)  $\sqrt{11}$       d)  $\sqrt{65}$       e) none of these

44. The number of combinations of five objects taken three at a time is =

- a) 1      b) 5      c) 10      d) 60      e) none of these

45. Two fair coins are flipped. The probability that both show tails is ...

- a)  $1/2$       b)  $1/4$       c) 1      d) 2      e) none of these