**Calculus Entry Exam (Pre-Calc / Alg 2)**

1. The equation, $4x^2 - 6x + 10 = 0$, has
   a) Three real solutions
   b) One real solution
   c) Two real solutions
   d) Four real solution
   e) No real solution
2. The remainder of dividing the polynomial $x^3 + x^2$ by $x^2 + 1$ is
   a) $-x - 1$
   b) $x + 1$
   c) 1
   d) 0
   e) x
3. Simplify $\dfrac{\dfrac{x+1}{(x^2-2x-3)}}{\dfrac{x-3}{x+1}}$
   a) $\dfrac{x+1}{(x-3)^2}$
   b) $\dfrac{1}{x+1}$
   c) $\dfrac{1}{x-3}$
   d) $\left(\dfrac{x+1}{x-3}\right)\left(\dfrac{x^2-2x-3}{x+1}\right)$
   e) 12
4. The distance From the point (1,2) to the point (2,1) is
   a) 2
   b) $3(2^{1/2})$
   c) 3
   d) $2^{1/2}$
   e) $3^{1/2}$

5. Which of the following points is closer to the point (1,1) than the point (2,2) is to (1,1)?

   a) (0 , 2)

   b) (0 , 0)

   c) (1 , 5/2)

   d) (0 , 1)

   e) (2 , 0)

6. A circle contains the four vertices of a square with diagonal of length 6. The area of the region outside the square and inside the circle is

   a) $9\pi - 9$

   b) $36\pi$

   c) 36

   d) $36\pi - 36$

   e) $9\pi - 18$

7. If $3x + 6 = 12$, what is x?

   a) All of the other answers are incorrect

   b) $x = 4$

   c) $x = 0$

   d) $x = 2$

   e) $x = -2$

8. If $x = y$ and $x^2y^2 - 5xy + 6 = 0$, then which of the following is possible

   a) $x^2 = 3$

   b) $x = 3$

   c) $x = 2$

   d) $x = 6$

   e) $x^2 = 6$

9. How many real solutions for x are there to the equation $x^2 + 3x + 8 = 0$

   a) It cannot be determined

   b) 0

   c) 2

   d) 1

   e) 3

10. $\log(3/2)$ equals

    a) $\log(3) - \log(2)$

    b) $\log(2) - \log(3)$

    c) $(1/2)\log(3)$

    d) $\log(2) + \log(3)$

    e) $3\log(1/2)$

11. $\log(x) < \log(2)$ reduces to

    a) $10 < x$

    b) $x < 10$

    c) $x < 2$

    d) x is not equal to 2

    e) $0 < x < 2$

12. $\log(x^2-2x+1) > \log(25)$ reduces to

    a) $x > -4$

    b) $x < -4$

    c) $x > 6$

    d) $x < 6$

    e) $x < -4$ or $x > 6$

13. If $f(x) = x^2 + 1$ and $g(x) = 2x - 1$, then $f(g(2)) =$

    a) 26

    b) 9

    c) 11

    d) 10

    e) 5

14. If $h(x) = x^3$, $g(x) = x^2 + 1$ and $f(x) = x + 1$, then $h(g(f(0))) + f(g(h(0)))$ is

    a) 0

    b) 16

    c) 9

    d) 4

    e) 10

15. If $f(x) = 3x^2 + 4$ and $g(y) = 2y^{1/2} + 5$, what is $g(f(2))$?

a) 10

b) 20

c) All of the other answers are incorrect.

d) 9

e) 13

16. The inequality $\frac{x}{x^2+1} > 0$

a) $x > 0$

b) $x > 1$

c) $x = 0$

d) $x < 1$

e) $x < 0$

17. The expression $-1 < \frac{1-x^2}{1+x^2} < 1$ is satisfied by what value of x?

a) All of the other answers are incorrect.

b) x not equal to 0

c) $-1 < x < 1$

d) All values of x satisfy this expression.

e) There are no values of x which satisfy this expression.

18. The inequality $\frac{x^3}{-4x^2+3x-5} > 0$

a) $x > 0$

b) $x < 0$

c) x is not equal to 0

d) None of the other answers is correct

e) $x = 0$

19. If $5x - 6y = 4$ and $3x + 4y = 10$, find x and y.

a) $x = 2$ and $y = 1$

b) $x = 4$ and $y = 1$

c) $x = -2$ and $y = -1$

d) $x = -2$ and $y = 2$

e) $x = 2$ and $y = -2$

20. If $x - y = 4$ and $4x - y = 1$, then $3xy$ is

    a) 6

    b) 12

    c) 9

    d) Cannot be determined

    e) 15

21. If $y + 4x - 5 = 0$ and $y = x^2$, then there is a solution with y given by

    a) $y = 0$

    b) Cannot be determined

    c) $y = 20$

    d) $y = 25$

    e) $y = 30$

22. If a circle has radius 2, then what is the radian measure of an angle whose vertex is at the center of circle and which cuts an arc of length 1 along the circle?

    a) $\pi/2$

    b) ½

    c) $1/(4\pi)$

    d) 2

    e) $2\pi$

23. If $\sin(a) = 1$, $\cos(b) > 0$, and $\sin(b) = ½$, then $\sin(a+b)$ is

    a) ½

    b) $3^{1/2}/2$

    c) 3/2

    d) 2/3

    e) $2/(3^{1/2})$

24. A triangle has sides of length 5, 5 and 8. What is the sine of its smallest angle?

    a) 3/8

    b) 3/5

    c) 4/5

    d) 8/5

    e) 5/8

25. Find $\lim_{x\to 3} \frac{x^2-x-6}{x-3}$

a) Cannot determine the limit

b) 5

c) 2

d) 0

e) -3

26. Find $\lim_{h\to 0} \frac{(x-h)^2-x^2}{h}$

a) Cannot determine the limit

b) $\infty$

c) 2x

d) $x^2$

e) 0

27. Find all the roots for $x^3 + 3x^2 - x - 3$

a) -3, -1, 1

b) -3, 0, 3

c) -3, -2, -1

d) -1, 1, 3

e) 2, 4, 5

28. Find all complex roots for $x^2 - 4x + 5$

a) $\pm i$

b) $2 + i$

c) $-i - 2$

d) $2 \pm i$

e) $\pm 2$

f)