

**MATH 1111 FINAL EXAM**

**FALL SEMESTER 2010**

1. Simplify the following expression, assuming the variables are positive:

$$(8x^{-3}y^6)^{\frac{2}{3}}$$

2. Perform the indicated operation and simplify the result. Leave the answer in factored form.

$$\frac{x}{x-2} - \frac{x+3}{x+2}$$

3. Find the real solutions of the following equation:

$$x^4 - 10x^2 + 9 = 0$$

4. Solve the following equation in the complex number system:

$$5x^2 + 1 = 2x$$

5. Express the following complex number in the form  $a + bi$ :

$$\frac{1}{4+3i}$$

6. Solve the following equation:

$$\frac{2}{3}x - (x+1) = \frac{1}{6}x$$

7. Find the real solutions to the following equation:

$$\sqrt{x+15} - 3 = x$$

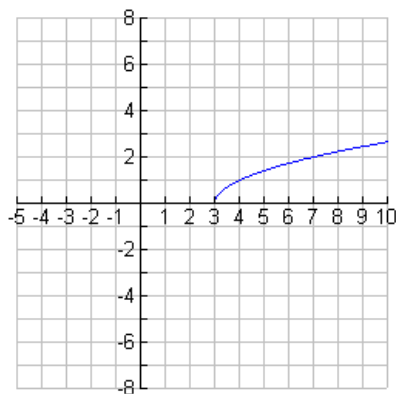
8. Solve the following inequality.

$$|(3x-4)-2| < 1$$

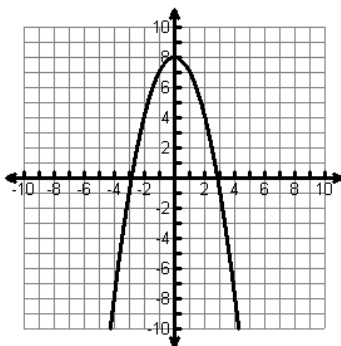
9. Find the distance between the points  $(-2,3)$  and  $(4,-5)$  .

10. Sketch the graph of the line described by the equation  $2x + y = 6$ .

11. Find the equation of the line that passes through the point  $(-3,0)$  and is perpendicular to the line with equation  $2x + y = 2$ . Express your answer using either the general form or slope-intercept form
12. The monthly payment  $P$  on a mortgage varies directly with the amount borrowed  $B$ . If the monthly payment on a mortgage is \$9 for every \$1000 borrowed, find the monthly payment  $P$  when the amount borrowed is \$175,000.
13. Tye has test grades of 75, 84, 92, 98, and 95. If the final exam counts as two test grades, what does he need to make on the final exam to have an 80 average?
14. Find the amounts of 20% and 30% alcohol solutions that must be mixed to obtain 5 liters of a 24% alcohol solution.
15. Find the domain of the the function  $f(x) = \sqrt{x-3}$ . The graph of the function is given as additional information.



16. Find the range of the function whose graph is as below:



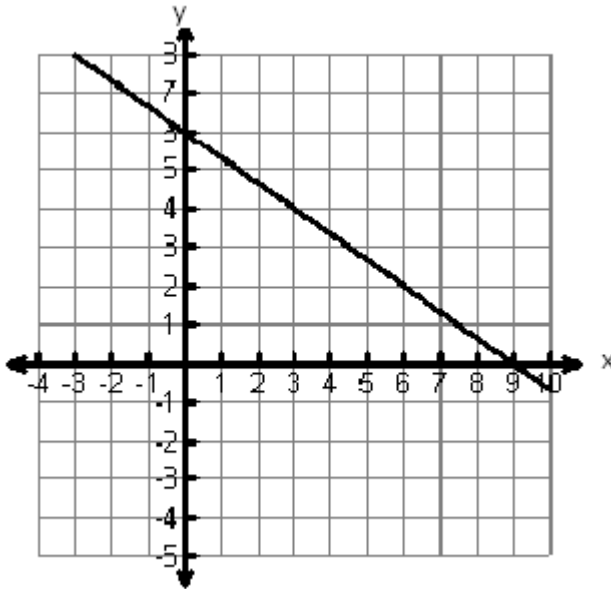
17. Solve the following inequality:

$$\frac{(x-3)(x+1)}{x-1} < 0$$

18. Solve the following equation:

$$|2x-1|-3=4$$

19. Given the graph of the function  $f$ , find  $f(6)$ :



20. The cost  $C$  of  $n$  shirts is described by the function

$$C(n) = \begin{cases} 5n, & 0 \leq n \leq 100 \\ 500 + 4(n - 100), & n > 100 \end{cases}$$

What is the cost of 400 shirts?

21. The cost  $C$ , in dollars, of renting a moving truck for a day is given by the function  $C(x) = 0.3x + 30$ , where  $x$  is the number of miles driven. If the cost of renting the moving truck is \$72, how many miles did you drive?

22. Find the vertex of the parabola described by the following quadratic function:

$$f(x) = x^2 + 4x + 7$$

23. Given  $f(x) = \frac{1}{\sqrt{3-x}}$  and  $g(x) = 2x - 8$ , find  $(f \circ g)(1)$ .

24. Find the inverse of the following one-to-one function:

$$f(x) = \frac{1}{1-2x}$$

25. Find the quotient and remainder:

$$(x^3 + 4x^2 + x - 6) \div (x - 2)$$

26. Find the y-intercepts of the graph of the equation  $x = y^2 - 4$ .

27. Solve the following equation. Find the exact value, or round to 3 decimal places.

$$\log_2(x-1) + \log_2(x+1) = 3$$

28. Solve the following equation. Find the exact value, or round to 3 decimal places.

$$e^{3x+1} = 90$$

29. Find the amount that results from investing \$12,000 at 4.5% compounded continuously for 5 years. Round your answer to the nearest cent. (The formula for continuous compounding is  $A = Pe^{rt}$ .)

30. Solve the system of equations. 
$$\begin{cases} 4x + 2y = 10 \\ 3x - y = 15 \end{cases}$$