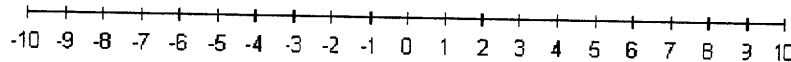


Math 111

Final Exam Name \_\_\_\_\_  
Section \_\_\_\_\_ Date \_\_\_\_\_

1. (a) Graph the solution set specified by the given statement. 2 points  
 $\{x \mid x > -3 \text{ and } x \leq 2\}$



- (b) Express the final solution set from part (a) in simplest interval format.

Interval(s): \_\_\_\_\_

2 points

2. Write in simplest form with only positive exponents.

$$\left(2a^{\frac{2}{3}}b^{-4}\right)^3 \left(-3a^{-\frac{1}{2}}b^{\frac{3}{2}}\right)^2$$

2. \_\_\_\_\_

4 points

3. Perform the indicated operations and simplify where possible. Show all work to receive credit.

$$\frac{3y}{y^2 - 7y + 10} - \frac{2y}{y^2 - 8y + 15}$$

3. \_\_\_\_\_

3 points

4. Write an equation for a function that has the shape of  $y = |x|$ , but is shifted left 4 units and up 3 units.

4. \_\_\_\_\_

2 points

5. The points  $(-2, 3)$  and  $(4, -5)$  are the endpoints of the diameter of a circle. Find the length of the radius of the circle.

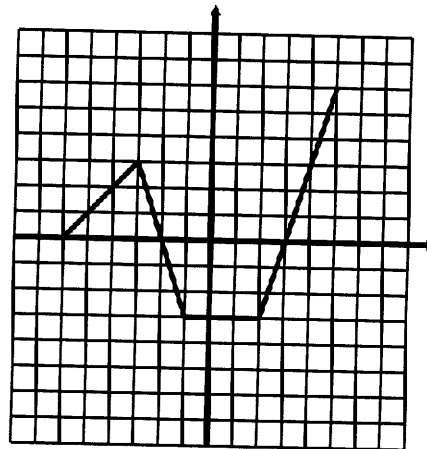
5. \_\_\_\_\_  
3 points

6. Find the equations of the line that passes through the point  $(-1, 5)$  and is perpendicular to the line  $3x - 4y = -8$ . Write in slope-intercept form.

6. \_\_\_\_\_  
4 points

7. A graph of  $y = f(x)$  is given below. No formula for  $f$  is given.

$$\text{Graph } y = -\frac{1}{3}f(x).$$



4 points

8. Solve the inequality  $|y + 5| \geq 2$  giving the solution in interval notation.

8. \_\_\_\_\_  
3 points

9. Solve for a:  $\frac{5}{a-4} - \frac{3}{a-1} = \frac{a+1}{a-4}$

9. \_\_\_\_\_  
3 points

10. Consider the function  $g(x) = x^2 - 15x + 36$  and find:

a) the zeros of  $g(x)$  a) \_\_\_\_\_  
2 points

b) the vertex of the graph of  $g(x)$  b) \_\_\_\_\_  
2 points

c) the range of  $g(x)$  (in interval notation): c) \_\_\_\_\_  
2 points

11. Solve for b:  $-2(b+3)^2 = 40$

11. \_\_\_\_\_  
3 points

12. A ball is thrown vertically upward with an initial speed of 48 ft/s. Its height, in feet, after  $t$  seconds is given by  $h(t) = -16t^2 + 48t$ . Find the maximum height of the ball and the time when it reaches that height.

12. \_\_\_\_\_  
4 points

13. Use division to find the quotient  $Q(x)$  and the remainder  $R(x)$ , and express  $P(x)$  in the form  $d(x) \cdot Q(x) + R(x)$ .

$$P(x) = x^3 - 2x^2 + x - 6$$

$$d(x) = x + 3$$

13. \_\_\_\_\_  
3 points

14. Find a polynomial of degree 4 with -2 as a zero of multiplicity 2 and 0 and 3 as zeros of multiplicity 1 and write as  $P(x) = a_n x^n + a_{n-1} x^{n-1} + a_{n-2} x^{n-2} \dots + a_1 x + a_0$ .

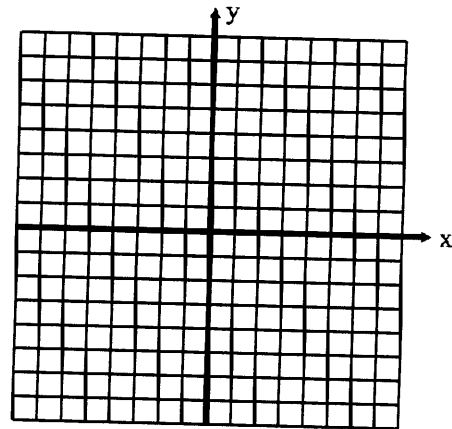
14. \_\_\_\_\_  
4 points

15. Make a graph of  $f(x) = \frac{6}{(x-2)^2}$ .

(a) Label all the asymptotes and y-intercept.  
3 points

(b) Give the domain in interval notation.  
\_\_\_\_\_ 2 point

(c) Give the  $x$ -intercepts.  
\_\_\_\_\_ 1 point



16. For the polynomial function  $P(x) = x^4 - 2x^3 - 5x^2 + 4x + 6$ , solve  $P(x) = 0$ .

16. \_\_\_\_\_ 4 points

17. Solve for  $x$  and write in interval form.  $3x^2 < 17x - 10$

17. \_\_\_\_\_ 3 points

18. The table below shows the average yearly income, in dollars, of individuals based on years of schooling. Use the calculator to model the data with a linear function.

Years of Schooling, $x$	Average Income, $y$
8	\$16,000
10	\$19,000
12	\$25,000
14	\$28,000

(a) \_\_\_\_\_ 3 points

(b) Use the function to estimate the average yearly income for an individual with 16 years of schooling.

(b) \_\_\_\_\_ 2 points

19. Solve the equations for  $x$ :

(a)  $4^{3x+1} = 16^{x+1}$

(a) \_\_\_\_\_  
3 points

(b)  $\log_2 x + \log_2(x-8) = 7$

(b) \_\_\_\_\_  
3 points

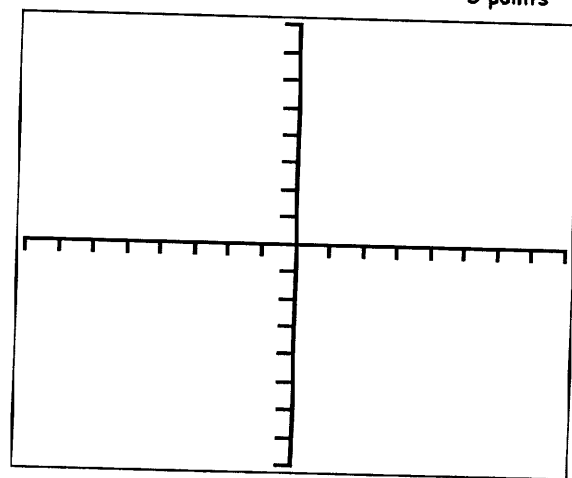
20. If \$3500 is deposited in an account that pays 5.4% APR compounded continuously. How long will it take to double the original deposit?  
(Round to the nearest tenth of a year)  $P = P_0 e^{rt}$

20. \_\_\_\_\_  
4 points

21. Graph the function. Show asymptotes and intercepts.

$F(x) = 2^x - 3$

3 points



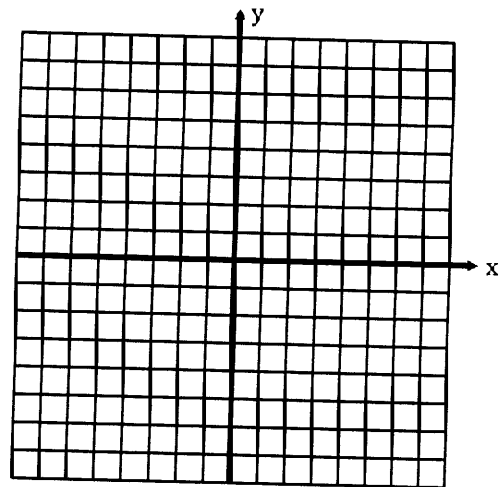
Xscl = 1      Yscl = 1

22. Solve for  $(x, y)$  using substitution or elimination:  $-x + 2y = 2$   
 $3x + y = 15$

22. \_\_\_\_\_  
3 points

23. Graph the solution to the system of linear inequalities.

$$2x + y < 2$$
$$x + 3y > 3$$



4 points

24. Solve for  $(x, y)$  algebraically:  $x^2 + y^2 = 25$   
 $2x + y = 10$

24. \_\_\_\_\_  
4 points

$$4x - y + z = -5$$

25. Consider the system:  $2x + 2y + 3z = 10$

$$5x - 2y + 6z = 1$$

(a) Write a matrix equation equivalent to the system.

(a) \_\_\_\_\_  
2 points

(b) Use your calculator and the inverse of the coefficient matrix of the matrix equation to solve the system.

(b) \_\_\_\_\_  
2 points

26. Use a system of equations to solve the following:

A grocer sells oranges for \$0.95 each and grapefruit for \$1.05 each. You purchase a mix of 16 pieces of fruit and pay \$15.90. How many of each type of fruit did you buy?

26. \_\_\_\_\_  
4 points

#### Notice

A grade of "C" or better in Math 111 is required to take Math 115 or Math 215, or if this course is to be applied to a teaching degree.

A passing grade (D or better) is required to take Math 118 or for this course to satisfy the  $A_2$ , Mathematics component of the University Core Curriculum.