

Math 111

Final Exam Name _____

Section _____ Date _____

1. Write in simplest form with only **positive exponents**.

$$(3x^{-2}y^5)^{-2}(-2xy^2)^3$$

1. _____
3 points

2. **Simplify.** $(2\sqrt{3} + 3\sqrt{5})(3\sqrt{3} - \sqrt{5})$

2. _____
2 points

3. Given two points $A(4,3)$ and $B(-2,6)$,

- a) Find the distance between A and B . Give an **exact answer** in simplest form.

a. _____
2 points

- b) Find the coordinates of the midpoint of the segment AB .

b. _____
2 points

- c) Find slope and write the equation of the line AB in **slope-intercept form**.

3. _____
3 points

4. Given the polynomial, $P(x) = -(x-1)^2(x-4)(x+2)$ find the following:

a. Degree of the polynomial: a. _____

1 point

b. End behavior: b. _____

1 point

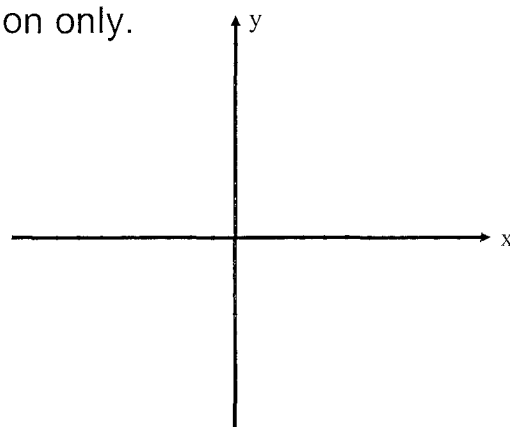
c. Zeros and the multiplicity of each:

3 points

d. y-intercept: d. _____

1 point

e. Sketch the graph using the above information only.



3 points

5. Solve $\sqrt{x+3} - 1 = x$.

5. _____
3 points

6. Given $f(x) = x^3 - 5x^2 - 10x - 4$.

Find all the zeros in exact value form.

6. _____
3 points

7. Solve. $A = \frac{1}{2}c(a+b)$ for b

7. _____
3 points

8. Solve. Write solution in interval notation.
 $|7 - 2x| \geq 3$

8. _____
3 points

9. Write an equation for a function that has a graph with the same shape of $y = x^2$, but reflected over the x-axis, shifted right 4 units and shifted up 3 units.

9. _____
3 points

10. Solve the system of equations using either the elimination or substitution method. **Write solution in (x, y) form.**

$$6x + 5y = -6$$

$$15x - 2y = 43$$

10. _____
3 points

11. Consider the function $f(x) = -x^2 + 6x - 8$,

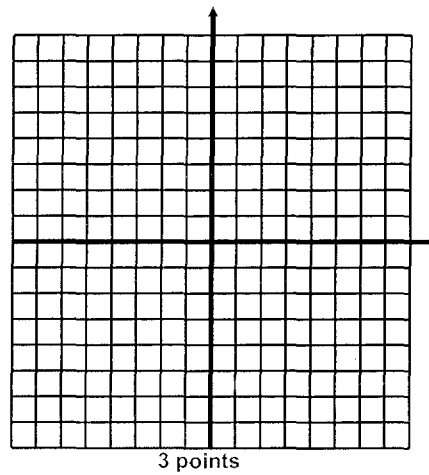
a) Find the vertex analytically. Show your work.

a. _____
2 points

b) Find the axis of symmetry.

b. _____
1 point

c) Graph the function.



d) State whether there is a maximum or minimum value and find that value.

c. _____
1 point

1 point

e) Find the range.

1 point

f) Find the intervals on which the function is increasing and the intervals on which the function is decreasing.

Increasing interval(s) _____
1 point

Decreasing interval(s) _____
1 point

12. Solve $3x^2 - 10x - 8 < 0$.

a. Find the critical numbers and graph on a number line. 2 points

b. Give the solution in interval notation. b. _____
2 points

13. Find the following given $f(x) = \frac{x+2}{x^2-9}$ if it exists or write DNE if not.

a. Vertical Asymptote(s): a. _____
1 point

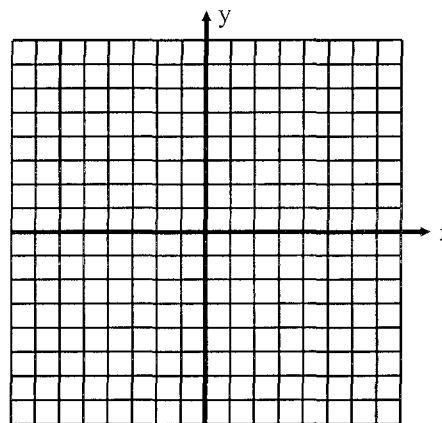
b. Horizontal Asymptote(s): b. _____
1 point

c. Oblique Asymptote(s): c. _____
1 point

d. x-intercept(s): d. _____
1 point

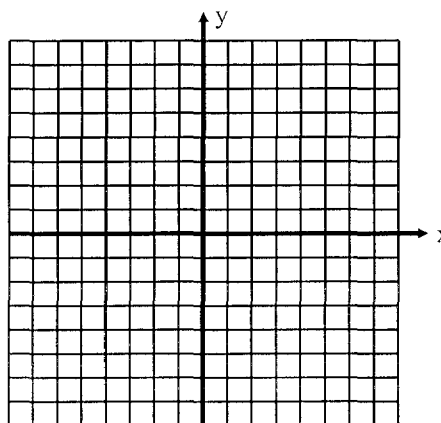
e. y-intercept(s): e. _____
1 point

f. Graph the function using the asymptotes and intercepts and plot additional points if necessary.



3 points

14. Given $f(x) = \sqrt{5+x}$, find:
a. graph of $f(x)$



2 points

- a. domain of $f(x)$, in interval notation
b. range of $f(x)$, in interval notation
c. inverse, $f^{-1}(x)$

- a. _____
1 point
b. _____
1 point
c. _____
3 points

- d. domain of $f^{-1}(x)$, in interval notation
e. range of $f^{-1}(x)$, in interval notation

- d. _____
1 point
e. _____
1 point

15. Solve $2^{2x+3} = 4^{-x}$

15. _____
3 points

16. Solve **analytically**. Show all work to receive credit.

$$\log_4(x-3) + \log_4(x+3) = 2$$

16. _____
3 points

17. Following the birth of a child, parents make an initial deposit of \$15,000. After 18 years, how much will be in the account for the child's education if interest is compounded continuously at 6.5%? Use $P(t) = P_0 e^{kt}$ to calculate the investment value.

17. _____
3 points

19. Write a system of equations and solve the following application. The owner of a coffee shop has a Hawaiian coffee that costs \$12.95/lb and a Columbian coffee that costs \$6.95/lb. She wants to create a blend costing \$8.99/lb. How many pounds of each type should she use in order to make 100 pounds of such a blend?

19. _____
4 points

20. Solve the system of equations using matrix methods. Write the matrices A and B, and indicate what calculator entry provides you with the solution. Give solution in the form (x, y, z).

$$2x - y + 4z = -35$$

$$3x + 8y - 6z = 68$$

$$x + 10z = -50$$

$$[A] = \begin{bmatrix} & & \\ & & \\ & & \end{bmatrix}$$

1 point

$$[B] = \begin{bmatrix} \\ \\ \end{bmatrix}$$

1 point

Calculator entry: _____
1 point

20. _____
1 point

21. Solve the system of non-linear equations. Give solutions in the form (x, y) .

$$x^2 + y^2 = 5$$

$$x - y = -1$$

21. _____
4 points

22. The accounting department at Eagles, Inc., reported the following data on the cost y (in dollars) of producing x gadgets.

x	0	100	200	300	400
y	700	2600	4500	6500	8350

a. Find the equation of the regression line that relates the cost to the number of gadgets produced.

a. _____
2 points

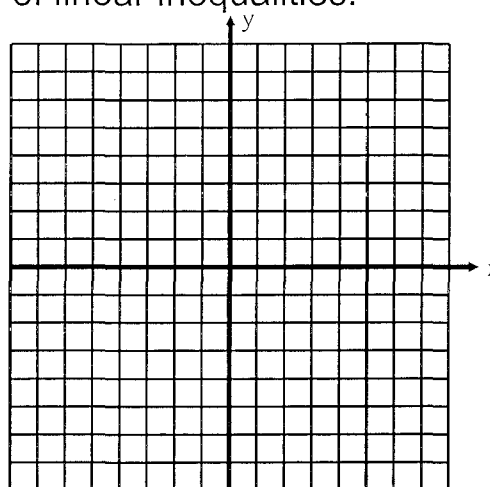
b. Use your equation to estimate the cost of producing 800 gadgets.

b. _____
2 points

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

$$2x + y < 0$$

$$x - 2y \geq -6$$



4 points