MTH 135 FINAL EXAM DEC. 12,1994 _____

NOTE: When $ax^2 + bx + c = 0$, $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$. When $y = ax^2 + bx + c$, the x-coordinate of the vertex of the parabola is at $x = -\frac{b}{2a}$.

I. Perform the indicated operations and simplify each expression as much as possible. All exponents should be positive and all fractions should have no common factors in the numerator and denominator. All like terms should be combined. (5 points each)

1. $5 - 2\left(3x - \left(x + 1\right)\right)$

2. $\left(-3x^2 y\right)^3 \left(x^2 y\right)^0$

3. $\frac{2x^2 y}{xy^{-1}}$

4. $\frac{x^2 + 4x}{x^2 - 4} \div \frac{y^2}{2y - xy}$

5. $\dfrac{2}{x-1} - \dfrac{3+x}{x^2-1}$

6. $\dfrac{n - \dfrac{4}{n}}{1 + \dfrac{n}{2}}$

7. $2 - \left[(3-4)^2 + 2 \right]$

8. -5^2

9. $\left(-\dfrac{1}{3} \right)^2$

10. evaluate ab - c for a = 5, b = -2, and c = -3 .

II. Solve the following equations for x. (6 points each)

1. $3x-(2+x)=14$

2. $4x^2+2x=0$

3. $1+\frac{2}{x-1}=\frac{2}{x^2-x}$

4. $\frac{ax+2}{y}=a$

5. $3(2x-5)=5(x-4)+x$

6. $xy+w=x$

III. Solve the following system of equations (7 points)

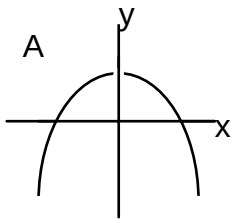
$3x - y = 2$

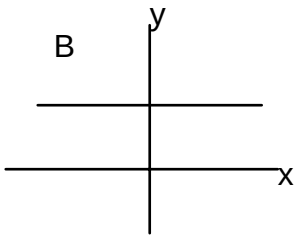
$x - 3y = -10$

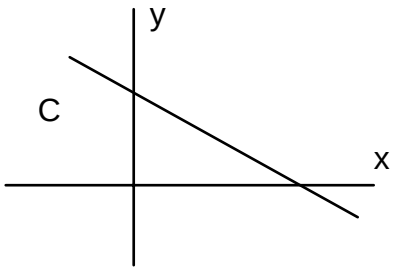
IV. Place the letter of each graph which best fits each description next to the problem. (3 points each)

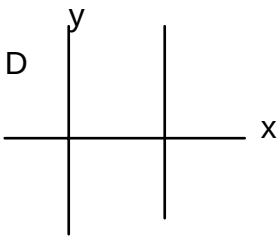
___ 1.) $x = 3$ ___ 2.) $y = -5x + 1$ ___ 3.) $y = -x^2 + 3$

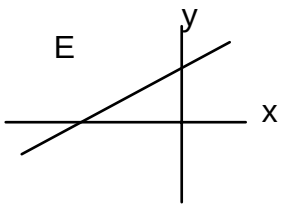
___ 4.) $y = x^2 - 4x$ ___ 5.) $y = (x + 2)^2$

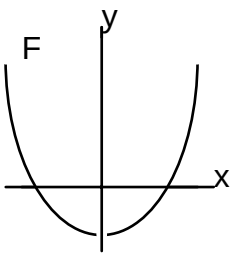


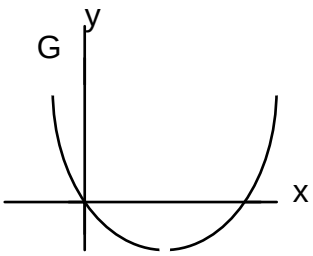


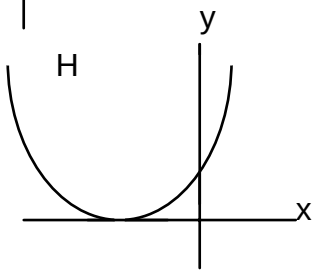






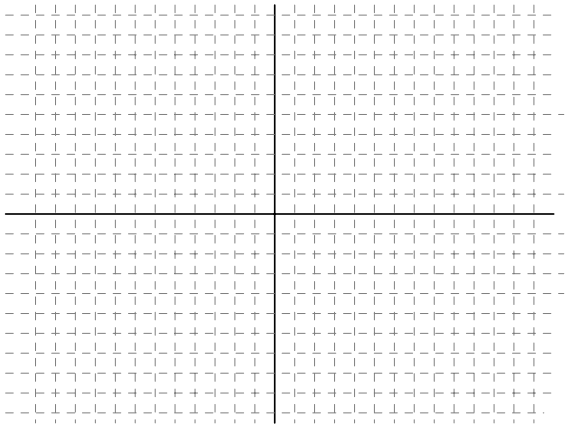




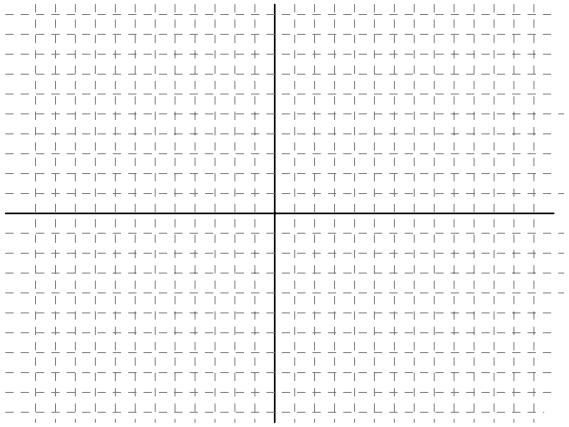


V. Graph the following equations. Label at least two points on each graph with their coordinates. (6 points each)

1. $y = \frac{-1}{3}x + 2$



2. $y = 2x^2 + 4x - 6$



VI. True or False (4 points each)

_____ 1. -4 is a solution to $x^3 = x^2 - 3x - 68$

_____ 2. (-3, 25) is a solution to $y = 2x^2 - x + 4$

VII. Short Answer

1. 20 is 30% of what number? (5 points)

2. Find the equation of the line that is perpendicular to the line $x + 3y = 4$ and goes through the point (6, 20). (8 points)

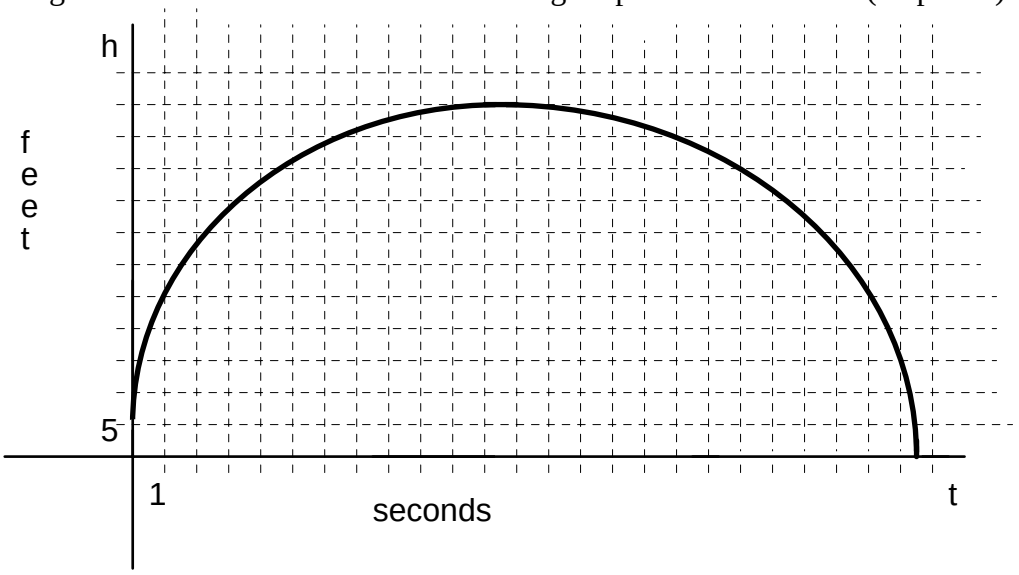
3. The money Kevin earns each week for his school is described by the equation $y = 8x + 300$ where x stands for the number of hours Kevin tutors per week and y is the amount of dollars Kevin earns in a week. (6 points)

(a.) The equation in this problem is: (Circle the correct answer.)
(i) exponential (ii) quadratic (iii) linear

(b.) What is the slope of the above equation?

(c.) What does the slope represent in this particular problem?

4. Suppose the following graph describes the height h (in feet) of a baseball above the ground t seconds after it is thrown straight up into the air. (12 points)



(a) What is the height above the ground the ball was released from?

(b) What is the highest the ball will go?

(c) When will the ball hit the ground?

(d) When is the ball 25 feet above the ground? (Hint: There are two answers.)

VIII. Circle the best answer for each of the following questions. (3 points each)

1. Suppose you have $16,000 and you put part of it into an account that pays 4% simple annual interest and the rest into an account that pays 7% simple annual interest.. Then you earn the same amount of interest that you would have earned if you put all the money into an account that pays:

(a) less than 4% simple annual interest.

(b) between 4% and 7% simple annual interest.

(c) more than 7% simple annual interest.

2. If one hose can fill a pool in 10 hours and another hose can fill the pool in 12 hours then when both hoses are turned on the pool can be filled in: (assuming the water pressure remains the same for both hoses)

(a) less than 10 hours.

(b) between 10 and 12 hours

(c) more than 12 hours

IX. Solve the following application problems. (7 points each)

1. A 20 foot pole is cut into two pieces. Three times the length of the larger piece is ten feet less than seven times the length of the smaller piece. Find the length of the two pieces.

2. The ratio of cement to sand in a concrete mixture is one to three. How much cement is needed in a mixture that has 200 pounds of sand?

3. Runfast Phone Company charges $0.21 for the first minute and eight cents for each minute after that, for a phone call from Indy to Lansing.Hurry Phone Company charges nine cents per minute for a phone call from Indy to Lansing.

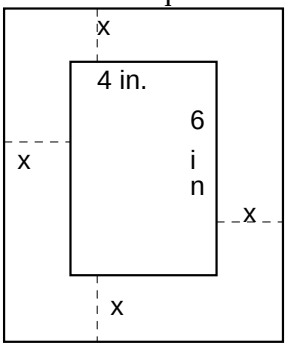
(a) Write the equations for the cost of a phone call y, in terms of the length of the call x in minutes for each company.

(b) Solve the system of equations and answer:

(i) For what amount of time is the cost the same?

(ii) What is the cost of the phone call when it is the same for each company?

4. The dimensions of a picture are 4 inches by 6 inches. The picture has a frame of uniform width all the way around. Find the width of the frame if the area of the frame itself is 96 square inches.



5. The Internal Revenue Service uses the following formula for depreciating business property linearly: $V = C\left(1 - \frac{n}{N}\right)$ where C is the original cost in dollars, and it is depreciated linearly over N years, and V is its value after it has depreciated *n* of those years. A machine having an original cost of $10,000 is depreciated linearly over 20 years. When is its value $6000?