MAT 112 Final Exam

December 14, 2005

Print Your Name: ____________________________________________________________

Signature: _________________________________________________________________

Circle Your Instructor’s Name:

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Instructions: This examination has 15 problems and 9 pages including this title sheet. Make sure your examination copy is complete before you begin solving the problems. Show ALL work required to solve the problems. Incorrect answers not support by work will receive no partial credit.

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1. a) Given the table of values below, evaluate the given function for the given input values.

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i) \( f(3) = \)  

ii) \( f(16) = \)  

iii) \( f(2) = \)  

b) Write an equation for the line passing through (1,2) and (3,6).

c) Given the following function \( y = -4x + 7 \). Complete the following statements:

(i) \( m = \)  

(ii) \( b = \)  

(iii) \( x\)-intercept =  

(iv) \( y\)-intercept =
2. Use the order of operations to simplify the following expression.

   a) \[ 28 \div (2 - 4^2) \]

   b) \[ -(1)^2 + 5 - 8 \]

3. Mary sells cars. Each week she is paid a flat rate of $225 plus $85 for each car she sells.
   a) Write an equation for Mary’s weekly pay.

   b) Create a graph of the function with two points labeled.

4. a) Simplify the following expression.

   \[ 3(2x - y) - (5x + 6y) \]
b) Match each equation with the algebraic property it demonstrates.

_____ Commutative property of addition  
   a. \((4 + 6) + 7 = 4 + (6 + 7)\)

_____ Commutative property of multiplication  
   b. \((3 - 1) \div 2 = 1\)

_____ Associative property of multiplication  
   c. \(-2(x + y) = -2x - 2y\)
   d. \(p + q = q + p\)

_____ Distributive property  
   e. \((9 \cdot 8) = 5 + 2 - 6\)
   f. \(5 \times (6 \times 7) = (5 \times 6) \times 7\)

_____ Associative property of addition  
   g. \(st = ts\)

5. State whether the following statements are true (T) or false (F) and give an example if it’s false.

_____ The product of two linear functions is a linear function.

_____ The sum of two linear functions is a linear function.

_____ The product of a linear function and a constant is a linear function.

6. Solve the following inequalities.

a) \(|1 - 5x| \geq 6\)  
b) \(|x - 3| < 2\)
7. Given the following CBR graph, explain how this graph was generated.

8. Use the quadratic formula to find the zeros of the following function:

\[ f(x) = 3x^2 + x - 4 \]
9. Given the absolute value graph below, answer the following questions:

![Graph of an absolute value function]

a) Identify the following values:
   
   (i) \( a = \)
   
   (ii) \( h = \)
   
   (iii) \( k = \)

b) Write the function for the graph in standard form.

10. State whether each of the following systems of equations has one solution, no solution, or infinitely many solutions. Explain why for each one.

   a) \[ \begin{align*}
   2x - 3y &= 1 \\
   4x + 2y &= 3 
   \end{align*} \]

   b) \[ \begin{align*}
   3x + 5y &= 7 \\
   6x + 10y &= 4 
   \end{align*} \]

   c) \[ \begin{align*}
   .5x - 4y &= 3 \\
   2x - 16y &= 12 
   \end{align*} \]
11. An arrow is shot vertically into the air from the ground. The height of the arrow after \( t \) seconds is given by \( s(t) = -4.9t^2 + 29.4t \)

a) Complete the square and write the function in standard form.

b) When will the arrow reach its maximum height? Explain how you know this.

c) Sketch the graph of the function including at least three points. Make sure to label your axes and identify the scale for each axis. Only include the parts of the graph that make sense for this problem.
12. A drama department production sold tickets at $6 for general admission, and $4 for SU students. For one night of the show, the total amount collected was $2876, and 525 tickets were sold. How many of each ticket were sold?

13. Raj needs to rent a moving van. Max’s Movers charges a flat rate of $16 plus $.10 per mile. Rick’s Rentals charges a flat rate of $25.

   a) Write an equation for the cost to rent from Max’s Movers.

   b) Write an equation for the cost to rent from Rick’s Rentals.

   c) If Raj is moving 100 miles away, which rental company should he use?
14. a) State whether the following statements are True or False.

______ The amount of homework is inversely proportional to the number of courses taken.

______ The time needed to clean a house varies directly as the size of the house increases.

b) If \( x \) varies inversely with \( y \), find \( x \) when \( y = 27 \) and \( k = 3 \).

c) If \( x \) varies directly with \( y \), find \( x \) when \( y = 15 \) and \( k = 3 \).

15. Simplify the following expressions.

a) \((-7)^2\)

b) \(-5^2\)

c) \(\frac{x^5y^{-4}}{x^2y^2}\)

d) \((2a^5b^{-3})^{-1}\)

e) \(4^2x^6x^7x^2\)