Mth 111 Outcomes for Exam 1   **NAME**

After studying, place a check mark next to those outcomes you feel you understand and/or are proficient with. Place a question mark next to those outcomes which you feel your skills/understanding is questionable. Turn in with your test.

To be successful in Mth 111 you should be able to …

Prerequisite Material

1. Solve a linear equation algebraically.

2. Solve a quadratic equation algebraically. (QF is adequate)

3. Graph a line from its equation.

4. Find the equation of a line from two points.

5. Find the equation of a line from a graph of the line.

6. Find the equation of a line using regression.

Functions (include algebraic form, graphic form, tabular form)

1. Explain the concept of a function. i.e. What is a function?

2. Determine if a relationship is a function. i.e. vertical line test

3. Understand function notation in algebraic, graphic and tabular sense.

4. Evaluate functions with change of variable, at a value, with new expression. e.g. $f(x) \rightarrow f(t)$, $f(2)$, $f(a + b)$

5. Give the domain and range of a function from its algebraic, graphic or tabular form.

6. Give increasing or decreasing intervals.

7. Find local maximums or minimums.

8. Find the roots (zeros) of a function.

9. Graph piecewise functions.

10. Rewrite a piecewise graph in algebraic format.

11. Rewrite an implicit function in explicit form. i.e. $F(x,y) = 0 \rightarrow y = f(x)$.

12. Graph a function in a 'friendly' window (appropriate window).

13. Simplify the different quotient. i.e. Simplify $\dfrac{f(x + h) - f(x)}{h}$

14. Compute the average rate of change. (i.e. avg slope)

15. Transform a function graphically. i.e. $y = f(x)$ vs. $y = a\, f(b(x \pm h)) \pm k$

Mathematical Models

1. Interpret a mathematical model in algebraic or graphic form.

2. Identify the independent vs. the dependent variable.

Quadratics

1. Graph a quadratic and identify the four critical points: roots, vertex and y-intercept.

2. Switch between the key quadratic forms:
$$y = ax^2 + bx + c \leftrightarrow y = a(x - h)^2 + k \leftrightarrow y = a(x - r_1)(x - r_2)$$

3. Find the equation of a quadratic from:

        (a) two roots and a third point (b) vertex and a third point., (c) three random points.

A Few Practice Problems for Midterm 1

Consider these questions as a possible test question. However, look over all material as this is only a sample of possible test questions. If you cannot figure out how to do the problem on your own come by for hints and help before the last minute.

1)   Outline the 7-step procedure for solving linear equations.

2) Solve for x $9(3x - 7) = -3(13 - 5x)$	3) Solve for x $7 - 2(3x - 5) = 3(3 - 2x)$	4) Solve for Q $7.2Q + 6.9 = 4.5(2Q - 1.4)$	5) Solve for x $\dfrac{2x - 5}{3} = x - 4$
6) Solve for x $\dfrac{2x}{3} + 4 = x + \dfrac{14}{3}$	7) Solve for x $\dfrac{3 - x}{2} + 3\frac{1}{2} = 5 - \dfrac{3 \cdot (2x - 5)}{2}$	8) Solve for x $\dfrac{3a - 5x}{2} = -4b$	9) Solve for W $P = 2L + 2W$
10) Solve for y $a(y - y_0) + b(x - x_0) = 1$	11) Solve for b $\dfrac{a - b}{4b} = 10$	12) Solve for a $a + 1 = \dfrac{a + b}{3}$	13) Solve for b $A = \dfrac{a + b}{2} \cdot h$
14) Solve for y $x + 2 = \dfrac{y + x}{2}$	15) Solve for y $\dfrac{3y - 5x}{2} = -4$	16) Solve for x $\dfrac{x}{3} + \dfrac{2}{5} = \dfrac{3}{4}$	17) Solve for x $\dfrac{5x}{2} + \dfrac{8}{7} = 12x - 12$

18)   Solve for x: (a) $3x^2 + 5x + 6 = 18$ (b) $3x^2 + 5x + 6 = 7x^2 + 2x - 5$

19)   Solve for x: (a) $6 - 4x(x + 2) + 1 = x + 12$ (b) $2x \cdot \dfrac{x + 1}{3} + 4x = \dfrac{(6x - 1)(x + 2)}{2}$

20)   Solve for x: (a) $ax^2 + 4x + 1 = x + 2$ (b) $3x^2 + 5x + c = 7x$

21)   Find the equation of the line through (a) (6, -7) and (-2, 3)   (b) (-152, 78) and (-213, 93)

22)   Find the equation of the line through (1, 8) and (a, b)

23)   Graph (a) $y = -\frac{3}{4}x + 24$ (b) $y = -0.6x + 20$ (c) $6x - 9y = 108$ (d) $5(x - 2y) + 3x - 4y = 2x + 7$

24)   Find the equation of the line through (5, -7) and parallel to $6x - 9y = 108$

25)   Find the equation of the line through (-8, 12) and perpendicular to $y = -0.6x + 20$

26)   Give the Domain for (a) $y = \dfrac{2 + 3x}{2x - 4} + 1$ (b) $y = \sqrt{x^2 + 1} - 1$ (c) $y = \dfrac{1 + x}{1 - x^2}$

27   Graph the quadratic and adjust the viewing window to show all four critical points. (a) $-0.1x^2 - 0.5x + 15$

28)   Given f(x) as shown, graph the following on the same graph.
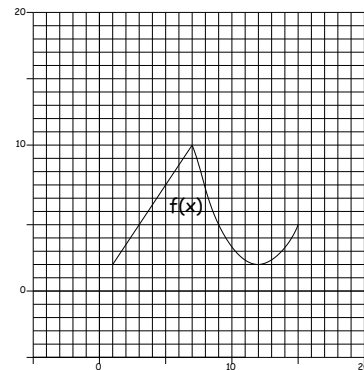
   (a) $f(x - 5) + 10$ (b) $f(2x)$ (c) $2f(x)$
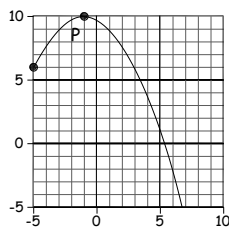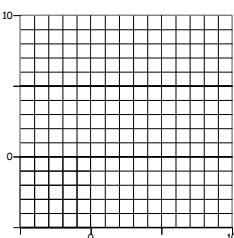
   (d) $f(-x)$ (e) $-f(x) + 10$ (f) $\dfrac{2f(x) - 6}{3}$

29)   Give the equation for p in standard form.

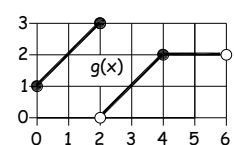
30a)   Graph

$f(x) = \begin{cases} x^2/2, & -4 < x \le 0 \\ x+1, & 0 < x < 3 \\ 5, & 3 \le x \le 8 \end{cases}$

30b)   Give g(x) in algebraic form.

KEY

Consider these questions as a possible test question. However, look over all material as this is only a sample of possible test questions. If you cannot figure out how to do the problem on your own come by for hints and help before the last minute.

1) Outline the 7-step procedure for solving linear equations.

2) Solve for x $\quad X = 2$ $9(3x - 7) = -3(13 - 5x)$	3) Solve for x $\quad \emptyset$ $7 - 2(3x - 5) = 3(3 - 2x)$	4) Solve for Q $\quad Q = 7\frac{1}{3}$ $7.2Q + 6.9 = 4.5(2Q - 1.4)$	5) Solve for x $\quad X = 7$ $\frac{2x - 5}{3} = x - 4$
6) Solve for x $\quad X = -2$ $\frac{2x}{3} + 4 = x + \frac{14}{3}$	7) Solve for x $\quad X = 3$ $\frac{3-x}{2} + 3\frac{1}{2} = 5 - \frac{3\cdot(2x-5)}{2}$	8) Solve for x $\quad X = \frac{8b + 3a}{5}$ $\frac{3a - 5x}{2} = -4b$	9) Solve for W $\quad W = \frac{P - 2L}{2}$ $P = 2L + 2W$
10) Solve for y $a(y - y_0) + b(x - x_0) = 1$ $y = [1 - b(x - x_0)]/a + y_0$	11) Solve for b $\quad b = \frac{a}{41}$ $\frac{a - b}{4b} = 10$	12) Solve for a $\quad a = \frac{b - 3}{2}$ $a + 1 = \frac{a + b}{3}$	13) Solve for b $\quad b = \frac{2A - ha}{h}$ $A = \frac{a + b}{2} \cdot h$
14) Solve for y $\quad y = x + 4$ $x + 2 = \frac{y + x}{2}$	15) Solve for y $\quad y = \frac{5x - 8}{3}$ $\frac{3y - 5x}{2} = -4$	16) Solve for x $\quad x = \frac{21}{20}$ $\frac{x}{3} + \frac{2}{5} = \frac{3}{4}$	17) Solve for x $\quad x = \frac{184}{133}$ $\frac{5x}{2} + \frac{8}{7} = 12x - 12$

18) Solve for x: (a) $3x^2 + 5x + 6 = 18 \quad x = \frac{4}{3}, -3$ (b) $3x^2 + 5x + 6 = 7x^2 + 2x - 5 \quad x \approx 2.075, -1.325$

19) Solve for x: (a) $6 - 4x(x + 2) + 1 = x + 12 \quad X = -1, -\frac{5}{4}$ (b) $2x \cdot \frac{x + 1}{3} + 4x = \frac{(6x - 1)(x + 2)}{2} \quad x = \frac{1}{2}, -\frac{6}{7}$

20) Solve for x: (a) $ax^2 + 4x + 1 = x + 2$ (b) $3x^2 + 5x + c = 7x$

21) Find the equation of the line through (a) (6, -7) and (-2, 3) $y = -\frac{5}{4}x + \frac{1}{2}$ (b) (-152, 78) and (-213, 93) $y = \frac{-15}{61}x + \frac{2478}{61}$

22) Find the equation of the line through (1, 8) and (a, b) $y = \frac{b - 8}{a - 1}x + 8 - \frac{b - 8}{a - 1}$

23) Graph (a) $y = -\frac{3}{4}x + 24$ (b) $y = -0.6x + 20$ (c) $6x - 9y = 108$ (d) $5(x - 2y) + 3x - 4y = 2x + 7$

24) Find the equation of the line through (5, -7) and parallel to $6x - 9y = 108$ $\quad y = \frac{2}{3}x - 31/3$

25) Find the equation of the line through (-8, 12) and perpendicular to $y = -0.6x + 20$ $\quad y = \frac{5}{3}x - 76/3$

26) Give the Domain for (a) $y = \frac{2 + 3x}{2x - 4} + 1$ (b) $y = \sqrt{x^2 + 1} - 1$ (c) $y = \frac{1 + x}{1 - x^2}$ Real except ± 1
    Real w/ $x \neq 2$ $\qquad\qquad\qquad$ All Reals

27 Graph the quadratic and adjust the viewing window to show all four critical points. (a) $-0.1x^2 - 0.5x + 15$
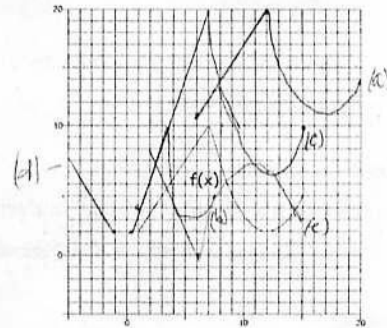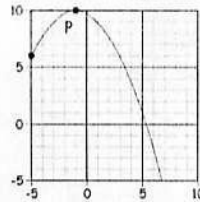
28) Given f(x) as shown, graph the following on the same graph.

   (a) $f(x - 5) + 10$ (b) $f(2x)$ (c) $2f(x)$
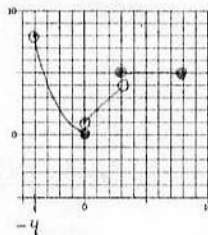
   (d) $f(-x)$ (e) $-f(x) + 10$ (f) $\frac{2f(x) - 6}{3}$

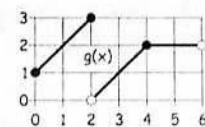29) Give the equation for p in standard form.

$y = \frac{-4}{16}(x + 1)^2 + 10$

30a) Graph
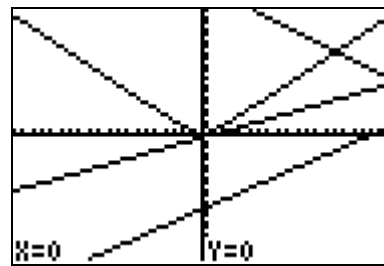$f(x) = \begin{cases} x^2/2, & -4 < x \le 0 \\ x + 1, & 0 < x < 3 \\ 5, & 3 \le x \le 8 \end{cases}$

30b) Give g(x) in algebraic form.

$g(x) = \begin{cases} x + 1, & 0 \le x \le 2 \\ x - 2, & 2 < x \le 4 \\ 2, & 4 < x < 6 \end{cases}$

23)

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Plot1  Plot2  Plot3
\Y1◻(-3/4)X+24
\Y2◻√(X²+1)-1
\Y3◻(6X-108)/9
\Y4◻(6X-7)/14
\Y5=
\Y6=■
\Y7=
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X=0   Y=0

27)

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WINDOW
 Xmin=-20
 Xmax=15
 Xscl=1
 Ymin=-3
 Ymax=20
 Yscl=1
 Xres=■
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Y1=-.1X²-.5X+15

X=-2.5   Y=15.625