MAT 111 – section _____ **Name:** Key
Test # 1, version B **Seat #:** ____ - ____
Chapter 1, and sections 2.1 & 2.2 100 **September 18, 2009**

Directions: Show all work algebraically unless otherwise indicated. If solving graphically, label the graph and the solution on the graph. If rounding is necessary, round to the **nearest hundredth**.

Solve the following equations. Find *all* solutions.

(10 points)

1. $\begin{cases} 2x - y = 0 \\ 4x + 2y = 12 \end{cases}$ (write your solution as a point)

2 multiply

add + $\begin{cases} 4x - 2y = 0 \\ 4x + 2y = 12 \end{cases}$

$8x = 12$

$x = \frac{12}{8} = \frac{3}{2}$

$2(\frac{3}{2}) - y = 0$

$3 - y = 0$

$y = 3$

Solution $(\frac{3}{2}, 3)$

or substitute

$y = 2x$

$4x + 2(2x) = 12$

$4x + 4x = 12$

$8x = 12$

$x = \frac{3}{2}$

etc

or graph + find intersection pt.

(10 points)

2. $x^2 + 5x + 8 = 0$

$x = \frac{-5 \pm \sqrt{5^2 - 4(1)(8}}{2(1)}$

$x = \frac{-5 \pm \sqrt{25 - 32}}{2}$

$x = \frac{-5 \pm \sqrt{-7}}{2}$

$x = \frac{-5 \pm \sqrt{7}\, i}{2}$

(10 points)

3. $|2x - 5| + 4 = 7$

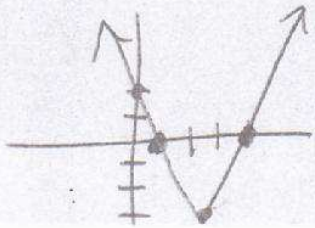
$|2x - 5| = 3$

$(2x - 5) = 3$ or $(2x - 5) = -3$

$2x = 8$ or $2x = 2$

$x = 4$ | $x = 1$

or graph $y = |2x - 5| - 3$



(10 points)

4. $\sqrt{2x - 2} = x - 5$

(Check your solutions)

$(\sqrt{2x-2})^2 = (x-5)^2$

$2x - 2 = x^2 - 10x + 25$

$0 = x^2 - 12x + 27$

$0 = (x - 9)(x - 3)$

$x = 9$ or 3

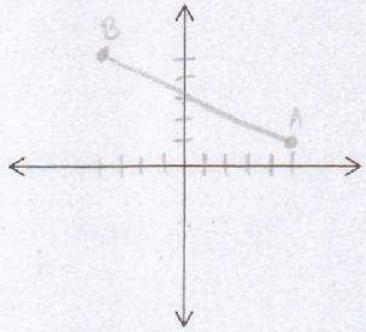
$x = 9$: $\sqrt{2(9)-2} = 9 - 5$; $\sqrt{16} = 4$; $4 = 4$ ✓

$x = 3$: $\sqrt{2(3)-2} = 3 - 5$; $\sqrt{4} = -2$; $2 \neq -2$

40

5. Given the points A (5, 1) and B (- 4, 5), find the following.

(2 points) a. Sketch a graph to illustrate these.



(6 points) b. Find the length of $\overline{AB}$.

$\sqrt{(y_2-y_1)^2+(x_2-x_1)^2}$

$\sqrt{(5-1)^2+(-4-5)^2}$

$\sqrt{4^2+(-9)^2}$

$\sqrt{16+81}$

$\sqrt{97}$

(4 points) c. Find the midpoint of $\overline{AB}$.

$\left(\frac{x_2+x_1}{2}, \frac{y_2+y_1}{2}\right)$

$\left(\frac{-4+5}{2}, \frac{5+1}{2}\right)$

$\left(\frac{1}{2}, 3\right)$

(9 points)

6. **Solve.** Illustrate your solution on a ***number line***. Use ***interval notation*** to express your solution.

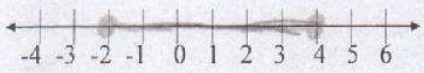
$-7 \le 1-2x \le 5$

$-1 \quad -1 \quad -1$

$-8 \le -2x \le 4$

$\frac{-8}{-2} \le \frac{-2x}{-2} \le \frac{4}{-2}$

$4 \ge x \ge -2$



Interval notation: $[-2, 4]$

(9 points)

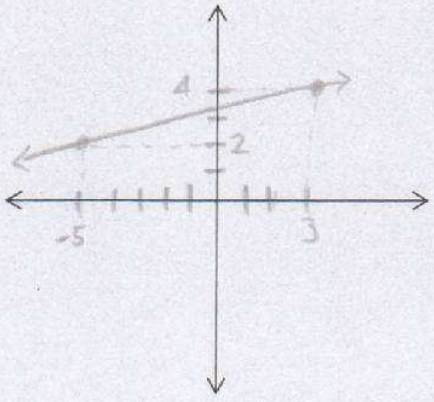
7. Find the **equation of a line** through the two points (- 5, 2) and (3, 4). (Graph your line to check your answer.)

$m = \frac{y_2-y_1}{x_2-x_1} = \frac{4-2}{3+5} = \frac{2}{8} = \frac{1}{4}$

$y-4 = \frac{1}{4}(x-3)$

$y-\frac{16}{4} = \frac{1}{4}x-\frac{3}{4}$

$y = \frac{1}{4}x+\frac{13}{4}$



(10 points)

8. For this equation, $4x + y = x^3$, determine the intercepts and the type of symmetry of its graph. Sketch the graph and label the intercepts.

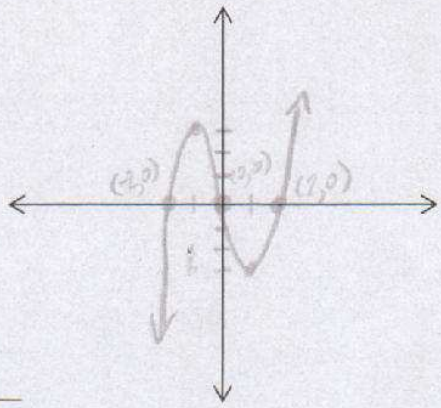
$Y = X^3 - 4X$

Y-int. → $Y = 0 - 0$ $(0,0)$

X-int. → $0 = X^3 - 4X$

$0 = X(X^2 - 4)$

$0 = X(X+2)(X-2)$ $(0,0)(-2,0)(2,0)$



The graph is symmetric with respect to the Origin

(10 points)

9. A movie theater charges \$9.00 for regular adult tickets and \$7.00 for senior citizens. On a day when 325 people bought tickets, the total receipts were \$2495. How many senior citizen tickets were sold? Tell what your variable represents, show your equation, your work and your solution.

$X = \#$ of senior citizen tickets sold

$Y = \#$ of adult tickets sold

$X + Y = 325$

$7X + 9Y = 2495$

$9X + 9Y = 2925$

$-7X - 9Y = -2495$

$2X = 430$

$X = 215$

-or- $7X + 9(325 - X) = 2495$

$7X + 2925 - 9X = 2495$

$-2X = -430$

$X = 215$

(10 points)

10. Solve: $\frac{2x}{x+3} = \frac{-6}{x+3} - 2$ $(\times 3)$ $(\times 3)$

$2X = -6 - 2(X+3)$

$2X = -6 - 2X - 6$

$4X = -12$

$X = -3$

$X = -3$ is an excluded value, therefore no solution exists