MTH 103 Review Problems for Midterm Exam II

1. (1.7 #22) Solve $3(x + 2) \leq 2(x + 5)$. Sketch the solution set and express your answer using interval notation.

2. (1.7 #38) Solve $0 \geq (5 - x)/2 \geq -10$. Sketch the solution set and express your answer using interval notation.

3. (1.7 #46) Solve $2 - x < 3x + 5 < 18$. Sketch the solution set and express your answer using interval notation. (Hint: The compound inequality represents TWO inequalities BOTH of which must hold.)

4. (1.7 #58) Solve $x^2 + 9x + 20 \geq 0$. Sketch the solution set and express your answer using interval notation.

5. (1.7 #82) Solve $3/(x + 2) \leq 4$. Sketch the solution set and express your answer using interval notation. (Hint: You cannot multiply by $(x + 2)$ because we do not know if it represents a positive or a negative value.)

6. (1.8 #18) Write $|x - 5|$ without absolute value symbols, assuming that $x \leq 5$.

7. (1.8 #28) Solve $|(3x + 11)/7| - 15 = -14$.

8. (1.8 #40) Solve $|x - 2| = |3x + 8|$. (Hint: Use $|x| = \sqrt{x^2}$.)

9. (1.8 #54) Solve $|2x - 7| - 3 > 2$.

10. (1.8 #66) Solve $8 > |4x - 1| > 5$. (Hint: The compound inequality represents TWO inequalities BOTH of which must hold.)

11. (1.8 #74) Solve $|x + 1| < |x + 2|$. (Hint: Use $|x| = \sqrt{x^2}$.)

12. (2.1 #76) Find the distance between $P(6, -3)$ and $Q(-3, 2)$.

13. (2.1 #88) Find the coordinates of $Q$ if $M$ is the midpoint of the line segment $PQ$ where $P(2, -7)$ and $M(-5, 6)$.

14. (2.1 #96) Rectangle $ABCD$ has $A(-3, -2)$, $AB$ and $CD$ parallel to the $x$-axis, $BC$ and $DA$ parallel to the $y$-axis, and $C$ lies in the first quadrant. If the perimeter of the rectangle is 42 and the length of side $AB$ is twice as long as side $BC$, determine the coordinates of $C$. (Hint: Sketch the rectangle so that you can visualize the problem.)

15. (2.2 #20) Determine the slope of the line through $P(2, \sqrt{7})$ and $Q(\sqrt{7}, 2)$. Simplify your answer.

16. (2.2 #60) The line $PQ$ is parallel to $RS$. Determine $y$ if $P(2, -3), Q(5, 7), R(3, -1)$, and $S(6, y)$.

17. (2.2 #62) The line $PQ$ is perpendicular to $RS$. Determine $x$ if $P(1, -2), Q(3, 4), R(x, 6)$, and $S(6, 5)$. 

18. (2.2 #76) Show that the points $E(-1, 1)$, $F(3, 0)$, $G(2, 4)$, and $H(-2, 3)$ are the vertices of a square. (Hint: What is the definition of a square?)

19. (2.3 #22) Write an equation of the line through $P(-5, -5)$ and $Q(0, 0)$.

20. (2.3 #66) Write an equation of the line parallel to $x = -3y$ and passing through $P(0, 0)$.

21. (2.3 #76) Write an equation of the line perpendicular to $x = -3y/4 + 5$ and passing through $P(1, -5)$.

22. (2.3 #82) Find an equation of the line parallel to the line $y = -8$ and passing through the midpoint of the segment joining $(-4, 2)$ and $(-2, 8)$.

23. (2.4 #18) Find the $x$ and $y$-intercepts of $y = x^2 + 2x - 3$. You must write an algebraic solution.

24. (2.4 #42) Determine the graph is symmetric about the $x$-axis, the $y$-axis, and/or the origin: $y = 3x^4 + 7$. You must write an algebraic solution.

25. (2.4 #86) Write an equation of the circle centered at $(-9, 8)$ and having radius $2\sqrt{3}$.

26. (2.4 #96) Determine the center and radius of the circle $3x^2 + 3y^2 + 6x - 30y + 3 = 0$ by writing the equation in standard form. Show all of your steps when completing the square.