HOMEWORK 2 - MATH 140 DUE DATE: Monday, February 7 INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. One part of each homework problem will be chosen at random and graded. Each question is worth 1 point. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

- 1. Solve the following radical equations
 - (a) $\sqrt{3 x + x^2} = x 2$
 - (b) $\sqrt{3x-5} \sqrt{x+7} = 2$
 - (c) $\sqrt[5]{4-7x} 2 = 0$
- 2. Solve the following absolute value equations
 - (a) $\left|\frac{x}{3} + \frac{2}{5}\right| = 2$ (b) $\left|x^2 + 3x - 2\right| = 2$
- 3. Solve the following absolute value inequalities and graph the solution intervals:
 - (a) $|5 7x| \ge 3$
 - (b) |1 2x| 4 < -1
- 4. Graph the following piece-wise defined function

$$f(x) = \begin{cases} x+3, & \text{if } x < -2\\ -2x-3, & \text{if } x \ge -2 \end{cases}$$

5. Graph the following piece-wise defined function

$$f(x) = \begin{cases} 3+x, & \text{if } -3 \le x < 0\\ 2, & \text{if } x = 0\\ \sqrt{x}, & \text{if } x > 0 \end{cases}$$

- 6. Start from known graphs and apply graphing techniques to obtain the graphs of the following functions
 - (a) $f(x) = \sqrt{x+3} + 1$
 - (b) $f(x) = 2(x-1)^2 3$
- 7. Let P = (x, y) be a point on the graph of the function $f(x) = \sqrt{x+2}$.
 - (a) Express the distance d(x) from P to the point (-1, 0) as a function of x.
 - (b) Use your calculator to graph d = d(x) (and, of course, plot the graph *neatly* on your paper to show me what you came out with).
 - (c) For what values of x is the distance d(x) smallest?

- 8. A rectangle is inscribed in the upper semicircle of radius 4 with center at the origin (its equation is $y = \sqrt{16 x^2}$). Let P be a point in the first quadrant that is a vertex of a rectangle and is on the circle (see the figure on page 237 of your book).
 - (a) Express the area A(x) of the rectangle as a function of x.
 - (b) Express the perimeter p(x) of the rectangle as a function of x.
 - (c) Graph A(x) and p(x) with your calculators (giving me a neat versions of the graphs you came up with).
 - (d) Find for which x A(x) is largest and for which x p(x) is largest.