HW Questions for Chapter 4 "Functions of One Variable"

1. Find the domains of the functions defined by the following formulas:

(a) $y = \sqrt{5 - x}$ (b) $y = (2x - 1)/(x^2 - x)$ (c) $y = 1 - \sqrt{x + 2}$

2. Find the linear functional form for the lines passing through (2,3) and (5,8)

3. Suppose demand D for a good is a linear function of its price per unit, P. When price is $10, demand is 200 units, and when price is $15, demand is 150 units. Find the demand function.

4. Find the equation for the linear line passing through (1, 3) and has a slope of 2.

5. Sketch in the xy-plane the set of all pairs of numbers (x,y) that satisfy $x-3y+2 \leq 0$.

6. Find the equilibrium price for the linear model of supply and demand: $D = 75 - 3P$ and $S = 20 + 2P$.

7. Determine the maximum/minimum points for (a) $x^2 + 4x$, (b) $-3x^2 + 30x - 30$.

8. Find all integer roots of the following equations. (a) $x^2+x-2 = 0$ (b) $2x^3 + 11x^2 - 7x - 6 = 0$

9. Perform the following division: $(2x^3+2x-1)/(x-1)$

10. The population of Botswana was estimated to be 1.22 million in 1989, and to be growing at the rate of 3.4% annually. If $t = 0$ denotes 1989, find a formula for the population $P(t)$ at data t. What is the doubling time?

11. Solve the following equations for x: (a) $\ln(x^2-4x+5) = 0$, (b) $x\ln(x+3)/(x^2+1) = 0$.

12. If a firm sells Q tons of a product, the price P received per ton is $P = 1000 - (1/3)Q$. The price it has to pay per ton is $P = 800 + (1/5)Q$. In addition, it has transportation costs of 100 per ton.
(a) Express the firm's profit as a function of Q, the number of tons sold and find the profit maximizing quantity.
(b) Suppose the government imposes a tax on the firm's product of 10 per ton. Find the new expression for the firm's profit and the new profit maximizing quantity.