Name:
Homework 2 solutions
Math 151, Applied Calculus, Spring 2016

Note: for solutions to odd numbered problems - see the text.
Section 1.4 – $1c, 7, 8, 15, 18, 26, 40, 42, 36, 42$

8. a). The cost of producing 500 units is

$$C(500) = 6000 + 10(500) = 6000 + 5000 = \$11,000.$$

The revenue the company makes by selling 500 units is

$$R(500) = 12(500) = \$6000.$$

Thus, the cost of making 500 units is greater than the money the company will make by selling the 500 units, so the company does not make a profit. The cost of producing 5000 units is

$$C(5000) = 6000 + 10(5000) = 6000 + 50000 = \$56,000.$$

The revenue the company makes by selling 5000 units is

$$R(5000) = 12(5000) = \$60,000.$$

Thus, the cost of making 5000 units is less than the money the company will make by selling the 5000 units, so the company does make a profit.

b). The break-even point is the number of units that the company has to produce so that in selling those units, it makes as much as it spent on producing them. That is, we are looking for q such that

$$C(q) = R(q)$$

Solving for q gives $q = 3000$.

26. a). Since cost is less than revenue for quantities in the table between 20 and 60 units, production appears to be profitable between those values.

36. $80b + 20s = 2000$, where b is the number of books bought and s is the number of social outings.

40. The new supply equation is $4(p - 2) - 20 = 4p - 28$

42. a). The equilibrium price is \$100 and the quantitty is 500.

b). If a \$6 tax is imposed on the suppliers the supply equation becomes

$$q = 10(p - 6) - 500 = 10p - 560.$$

c). To obtain the portion of tax paid by the consumer, find the new equilibrium price and quantity $(\$102, 460)$. This means that the consumers pay \$2. The producer will pay \$4 which means they get to keep $\$102 - \$4 = \$96$ per item sold.

d). The total revenue for the government is Tax $\cdot$ Quantity sold $= 6 \cdot 460 = \$2760$.

Section 1.5 – 1,2,4,8,10,20,28,30,32

2. In each of these cases recall thet if
$$A = A_0(a)^t$$
then the initial amount is A_0 and if the growth factor $a > 1$ we have exponential growth otherwise we have decay.

4. $y = 30(0.94)^t$

8. a). Since the price is decreasing at a constant absolute rate, the price of the product is a linear function of t. In t days, the product will cost $804t$ dollars.

   b). Since we have a constant percentage of decrease the price of the product is $80(0.95)^t$ dollars.

10. a). 1.26%.

    b). In 2004 population is 6.4 billion. In 2010, population is 6.9 billion.

    c). Average rate of change is 0.083 billion people per year.

20. a). $a = 1.5$, $P_0 = 22.222$.

    b). growing at 50% annually.

28. a). $W = 39,295 + 16,321.6t$

    b). $W = 39,295(1.252)^t$.

    d). Plug in $t = 6$ into the linear and exponential models for $W(t)$.

30. For each table check the rate of change and percentage change. If the rate of change is constant the function if linear, if the percentage change is constant, the function is exponential. Otherwise neither.

32. The minimum wage has grown by 4.69% per year.

Section 1.6 – 2,10,18

2. $t = 1.209$

10. $t = 1.0217$

18. Initial quantity = 7.7; growth rate = $-0.08 = -8\%$ (decay).