Math 1712 - Winter/Spring 2007
Quiz 2 - Solutions

1. (10 points) The relationship between the temperature in degree Celsius (C), and in degrees Fahrenheit (F) is given by: \[ C = \left(\frac{5}{9}\right) (F - 32). \]
   a. Solve this for F. b. If the temperature is 85 degrees Fahrenheit, what is the temperature in degrees Celsius? c. If the temperature is -15 degrees Celsius, what is the temperature in degrees Fahrenheit?

Solution: a. \[ C = \left(\frac{5}{9}\right) (F - 32) \implies F = 32 + \frac{9}{5} C \text{ (or equivalent)} \]

b. \[ F = 85 \implies C = \left(\frac{5}{9}\right) (85 - 32) = \frac{265}{9} = 29.4 \]

c. \[ C = -15 \implies F = 32 + \frac{9}{5} (-15) = 5 \]

2. (10 points) The percent of homes with digital TV's was 6% in the beginning of 1999 \((t = 0)\). This is expected to grow linearly so that at the beginning of 2003 \((t = 4)\), the percent will be 31%. Let \(P\) = percent of homes with digital TV's and let \(t = \text{time} (t = 0 \implies 1999)\). a. Express \(P\) as a function of \(t\). b. Using your answer to a, what percent of homes will have digital TV's at the beginning of 2006.

Solution: a. \((0, 6)\) and \((4, 31)\) are two points on the line \(\implies m = \text{slope} = (31-6)/(4-0) = 6.25\). Also, 6 is the \(P\) intercept \(\implies \implies P = 6.25 t + 6.\)

b. \(2006 \implies t = 7 \implies P = 6.25*7 + 6 = 49.75\%\)

3. (10 points) The weekly demand and supply functions for Sportman tents are given by:

\[ p = -0.1 x^2 - x + 40 \text{ (demand)} \]

\[ p = 0.1 x^2 + 2 x + 20 \text{ (supply)} \]

where \(p\) = unit price ($) and \(x\) = number of tents produced and sold (hundreds). Find the equilibrium price and quantity.
Solution: Equilibrium means that Supply = Demand. So we must solve for \( x \):

\[
0.1 \ x^2 + 2 \ x + 20 = -0.1 \ x^2 - x + 40
\]

We can rewrite this by moving everything to the LHS: 
\( 0.2 \ x^2 + 3 \ x - 20 = 0 \)

Now use the QF to solve for \( x \): \( x = 5 \) and \(-20\); so we take \( x = 5 \) (hundred)

We also need \( p \): \( p = .1*5^2+2*5+20 = $32.50 \)

or \( p = -.1*5^2-5+40 = $32.50 \)