MATH 1030: Homework 9

due November 5, 2012

Instructions: Do the following problems on a separate sheet of paper. Show all of your work.

Problem 1

There were 10,937 violent crimes committed in San Francisco in 1994 and 7,409 violent crimes committed in 1998. It may or may not be a coincidence that these years are the exact years that Barry Bonds won Gold Gloves and Silver Sluggers while playing for the San Francisco Giants.

(a) Develop a linear equation describing the number of violent crimes in San Francisco as a function of the year.

(b) According to your equation, how many violent crimes were committed in San Francisco in 1995?

(c) If Barry Bonds hadn't injured his elbow in 1999, use your linear equation to determine the year in which there would have been only 5000 violent crimes.

Problem 2

The following (made-up) table describes the correlation between the average size of computers in cubic feet and the global land surface temperature in degrees Fahrenheit.

computer size	4	2	1	0.5
global temp	40.6	42.6	43.6	44.1

(a) Find a linear equation that describes the global land surface temperature as a function of the average size of computers.

(b) According to your function, how large are computers when the global land surface temperature is 42.9?

(c) According to your function, how warm will the earth be when computers are one-tenth of a cubic foot?

Problem 3

A new strain of avian influenza (bird flu) is ravaging the town of Franklin. Suppose the number of people infected by this bird flu is increasing at a rate of 4% per day. The current number of infected persons is 29.

(a) How many infected persons were there 1 week ago?

(b) How many infected persons will there be 100 days from now?

(c) When will the entire population (14,000) of Franklin become infected?

Problem 4

Luckily, Franklin hospitals are in possession of a bird-flu antibiotic medication. Suppose the amount medication in the blood stream decays at a rate of 7% per hour.

(a) If a patient takes 500mg of medication, how many milligrams of antibiotic will be in the blood stream 24 hours later?

(b) If there is 100mg of medication in a patients bloodstream, how many milligrams were in the blood stream 4 hours before?

(c) If a patient takes 500mg of medication, how long until there is only 50mg of medication left in the bloodstream?

Problem 5

This new strain of avian influenza is very potent - the number of viruses in a body doubles every 15 hours.

(a) If there is only 1 virus initially, how many viruses will there be 3 days later?

(b) If there is only 1 virus initially, how long will it take for the number of viruses to reach 1,000,000?

(c) If there are 1000 viruses in a body right now, how many viruses were there 8 hours ago?

Problem 6

Even with the antibiotics, there are still a large number of fatalities in Franklin. In fact, the number of people left alive is cut in half every 40 days.

(a) Before the virus hit, there were 14,000 people alive in Franklin. How many people will be alive 1 year after the virus arrives?

(b) How long will it take until there are only 100 living people left in Franklin?