EXAM 2 - MATH 111 Friday, October 5

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Read each problem **very carefully** before starting to solve it. Each problem is worth 10-15 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Suppose that we want to place an order to a restaurant. The order will include n chicken salads, which cost \$3.50 each, and m burgers, which cost \$2.80 each.

   (a) Find a formula that gives the total cost C in dollars of the order placed.

   (b) If the total cost is predetermined to be $C = 162.40$ dollars, write down an equation that relates the number of units of each of the two menu items to be ordered from the restaurant. (Many variants may be possible.)

   (c) Solve for n the equation that you wrote in the previous part.

   (d) How many chicken salads are to be ordered, if 18 burgers are ordered, given that the total cost is \$162.40?

2. The temperature C of a fresh cup of coffee t minutes after it is poured is given by

$$C = 125e^{-0.03t} + 75 \text{ degrees Fahrenheit.}$$

(a) Make a graph of C versus t. Make your own judgment as far as window goes, but make sure to **label** your axes and **be neat**.

(b) The coffee is cool enough to drink when its temperature is 150 degrees. How long does one have to wait for it to be cool enough?

(c) Your uncle Jim, who likes his coffee rather hot, would rather brew a fresh cup when his own coffee is colder than 100 degrees Fahrenheit. If Jim starts drinking his coffee when it is cool enough to do so (previous part), how much time does he have to finish his cup, before it becomes too cold?

(d) What is the temperature of the coffee in the pot and what is the room temperature? Please explain.

3. The balance B of an employee health plan in millions of dollars as a function of time t in years since the plan was instituted is given by

$$B(t) = 60 + 7t - 50e^{0.1t}.$$

(a) Create a neat graph (**with labels**) of the balance B versus time t over the first 7 years of the plan.

(b) At which point in time is the balance of the plan at its maximum?

(c) What is the smallest value of the balance over the first 7 years of the operation of the plan?

(d) Does the balance have a limiting value? If yes, what is it? Please, explain.

4. Use the **sign table method** to solve for x the inequality $\dfrac{x^2 - 5x - 14}{5 - x} \leq 0$. Then provide the solution set in both graphical and interval notation.