Linear Systems 4   Name:_____

YOU MAY USE A CALCULATOR TO VERIFY SOLUTIONS, BUT NOT TO PROVIDE THEM.

Show all relevant work!

For each problem below, (a) write a suitable system of equations and (b) use the system to answer any questions.

0. Big Gas charges $2.55 per gallon of gas while Black Gold charges only $2.47 per gallon but tacks on 45¢ service charge. Under what circumstances is one a better deal than the other?

1. **Changing Populations**. Doodville has a population of 12,200 in 2006. Its population has been increasing at a rate of 700 people per year. Funky Town has a population of 18,000 in 2006 and its population has been increasing at a rate of 300 people per year. Assuming the rates stay the same, in how many years will the populations of these two cities be the same?

2. We recall that Doodville has a population of 12,200 in 2006 and an increase of 700 people a year. Cheez City had a population of 25,500 in 2000 but only 24,000 in 2006. Assuming the populations change linearly, in how many years will the populations of these two cities be the same?

3. Tina and her friends go to the Santa Cruz Beach Boardwalk. When they get there they discover that they have two ticket options. One option is to buy an admission ticket for $5.00 and pay 25¢ ($0.25) for each ride. Option 2 is to buy an admission ticket for $2.00 and then pay 75¢ ($.75) for each ride. Which option should Tina take? Explain.

4. **Temperature**. Remember that 0° Celsius is equivalent to 32° Fahrenheit (the freezing point of water), and 100° Celsius is equivalent to 212° Fahrenheit (the boiling point of water).

(a) Express these values as ordered pairs and use them to help you find a conversion formula for Fahrenheit given Celsius temperature. $(F(C) = mC + b)$

(b) Solve your equation in (a) for the Celsius temperature to obtain a conversion formula for Celsius given Fahrenheit temperature. $(C(F) = mF + b)$

(c) Using y for the dependent variable in each equation, and x for the independent variable in each equation, write (a) and (b) as a system of equations and solve them to find the temperature where Fahrenheit and Celsius are the same.