BONUS

1) The population of a bee colony in 2008 is 800 bees. The population of that colony grows to 900 in 2012. The population is a function of time in the exponential model $P(t) = P_0 e^{kt}$ where $t = 0$ represents the year 2008.

a) Define the variables given this information and identify the two ordered pairs to use as points.

b) Graphing

i) Label the axes appropriately for the context of the problem.

ii) Graph (plot) the 2 points. (*Just* the two points, in correct (relative) position. We will finish the graph later.)

c)

i) Find the growth rate. Show your work. Round to 4 decimal places.

ii) Find the equation of the exponential function which models the situation.

d) Graph the equation of the curve on the same graph as the two points in part b. (I'd *rather* you just did the graph of the thing (correct *shape*) and then stuck the two points on it in relatively correct position.)

e) Use your equation (with k rounded to 4 places) to find the estimated population in 2017. Show your work.

f) Use the equation to calculate in what year the population will reach 1000 if the growth continues at this same rate. Show your work.

g) What would be the effect to the population if the rate had the opposite sign? Use complete sentences in your explanation.

h) List two real-life factors which may affect the population such that this model would not prove valid. Use complete sentences.