Exponential Growth/Decay Word Problems

1. Suppose that an amount *P* is invested in a savings account where interest is compounded continuously at 7% per year. That is, the balance *A* grows at the rate given by $\frac{dA}{dt} = 0.07A$.

    a. Find the function that satisfies the equation. List it in terms of *P* and 0.07.
    b. Suppose that $100 is invested. What is the balance after 2 years?
    c. After what period of time will an investment of $100 double itself?
    d. After what period of time will an investment of $100 quadruple itself?
    e. Suppose the money doubled in 150 days. What would the rate be per day?

2. A bank advertises that it compounds interest continuously and that it will double your money in 12 years. What is its annual interest rate?

3. At the birth of their baby, a couple decides to make an initial investment of *P* that will grow to $80,000 by her 18th birthday. Their bank compounds interest continuously at 6%. What should their initial investment be?

4. Jane bought a Saturn Vue in 2002 for $20,000. In 2007, the salvage value of her Vue was $15,000.

    a. Find the value of *r,* the rate of growth. Write the corresponding exponential equation.
    b. What is the salvage value in 2010?
    c. In what year (theoretically) will the salvage value of the Vue be half of what Jane paid for it.

5. The annual consumption of pork per person was about 35 lb in 1997 and about 20 lb in 2007. Assuming consumption is decreasing according to the exponential-decay model:

    a. Find the value of *r*, the rate of growth. Write the corresponding exponential equation.
    b. Estimate the consumption of pork in 2010.
    c. In what year (theoretically) will the consumption of pork be 10 lb per person?