Geometric Growth and Decay Worksheet

A number sequence has Geometric Growth if each succeeding term can be obtained by multiplying the prior term by a constant number. For example, starting with an initial term of 3, repeatedly multiplying by 5 leads to this geometric growth sequence: 3, 15, 75, 375, 1875, … The common multiplier at each step is referred to as a *growth factor*. It can be any number (*e. g.* a whole number, a fraction, a decimal, and either positive or negative).

1. Which of the sequences demonstrate geometric growth? How do you know? If so, what is the growth factor? What is the difference equation?
   a. 1, 5, 25, 125, 625, ...

   b. 1, 3, 7, 15, 31, ...

   c. 4, 2, 1, .5, .25, ...

   d. 6, 6, 6, 6, 6, ...

   e. 1/2, -1, 2, -4, 8, ...

2. Suppose the following sequence is geometric: $s_0 = 3,\ s_1 = 6,\ s_2 = 12,\ s_3 = 24,\ s_4 = 48$. What is the growth factor? What is the difference equation?

3. Find a functional equation for the sequence s_n in problem 2. Why do you know it is correct?

4. For $a_{n+1} = 1.6 \cdot a_n$, if the initial term is $a_0 = 4$, what is the functional equation for a_n?

5. Suppose in a geometric growth sequence $b_1 = 1.5$ and $b_3 = 13.5$. Find the growth factor for the sequence, b_0, a difference equation and a function equation for b_n