Recurrence Relations

Use a spreadsheet to answer the questions:

1. Henry is retired and has £160,000 invested in a pension fund. This fund earns interest at 5% per annum. At the end of each year Henry withdraws £16,000. How many years will the fund last?

2. At 9am a patient is given a dose of medicine containing 1000mg of a drug. Every hour the amount of the drug in the patient's system drops by 6%.
   a. How much of the drug will be in the patient's system at 2pm?
   b. The doctor prescribes a course of treatment where the patient will receive a 1000mg dose every 6 hours. The treatment will take place over several days. The maximum safe level of drug in the patient's system is 3500mg. Is this treatment regime safe?

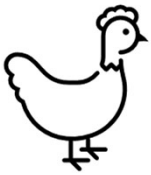
3. A bookseller has 12,235 books in stock. She estimates she will sell about 10% of her stock each week. She plans to purchase 1,300 books each week. The maximum number of books she can store is 12,950. If the her 10% estimate is correct, will purchasing 1,300 be sustainable?

Recurrence Relations

4. In a farming simulation game, a newly bought chicken weighs 150g. Each day the chicken grows in mass using the following code:

Multiply the previous day's mass by 0.9, then add 200g. Round the weight to the nearest integer.

a) Find the maximum mass of a chicken in the game.
b) How many in-game days does it take for a new chicken to mature?



5. A sequence is generated by increasing the previous term by 50%, then subtracting 30.
   a) For which starting numbers would the sequence get larger?
   b) For which starting numbers would the sequence get smaller?
   c) Which starting number would the sequence converge?

6. Leno deposits £1000 into an account that pays 10% interest per annum. After one year, he withdraws 1p. Each subsequent year he withdraws double the previous year's withdrawal. How many years until his account is empty?