1. Find the first five terms of the sequence defined by each of these recurrence relations with initial conditions.
    a. $a_n = na_{n-1} + n^2a_{n-2},\ \ a_0 = a_1 = 1.$
    b. $a_n = a_{n-1} + a_{n-3},\ \ a_0 = 1, a_1 = 2, a_2 = 0.$
2. Let $a_n = 2^n + 5 \cdot 3^n\ for\ n = 0,1,2,3, \ldots$
    a. Find $a_0, a_1, a_2, a_3\ and\ \ a_4$.
    b. Show that $a_n = 5a_{n-1} - 6a_{n-2}\ for\ all\ integers\ n \geq 2.$
3. Show that the sequence $\{a_n\}$ is a solution of recurrence relation $a_n = a_{n-1} + 2a_{n-2} + 2n - 9$ if
    a. $a_n = -n + 2$
    b. $a_n = 5(-1)^n - n + 2$
    c. $a_n = 3(-1)^n + 2^n - n + 2$
    d. $a_n = 7 \cdot 2^n - n + 2$
4. Find the solution to each of these recurrence relation with the given initial conditions.
    a. $a_n = -a_{n-1},\ where\ a_0 = 5.$
    b. $a_n = a_{n-1} + n,\ where\ a_0 = 1.$
    c. $a_n = na_{n-1},\ where\ a_0 = 5.$
5. Suppose number of bacteria in a colony triples every hour.
    a. Set up a recurrence relation for the number of bacteria after n hours have elapsed.
    b. If 100 bacteria are used to begin new colony, how many bacteria will be in the colony after 10 hours.
6. Assume that the population of the world in 2002 was 6.2 billion and is growing at the rate 1.3% per year.
    a. Set up a recurrence relation for the population of the world n years after 2002.
    b. Find the explicit formula for the population of the world n year after 2002.
    c. What will be the population of world in 2023?
7. A factory makes custom sports cars at an increasing rate. In the first month 1 car is made. In the second month 2 cars are made, and so on, in nth month n cars are made.
    a. Set up a recurrence relation for the number of cars produced in the first n moth of a factory.
    b. How many cars are produced in first year.
    c. Find an explicit formula for the number of cars produced in the first n months by this factory.
8. (a) Find the recurrence relation for the balance $B(k)$ owed at the end of k months on a loan at a rate r if a payment P is made on the loan each month. {Hint: Express B(k) in terms of B(k-1) and note that monthly rate of interest is $\frac{r}{12}$.
   (b) Determine what monthly payment P should be so that the loan is paid off after T months.