CMPSCI 182 – Project 1
Recursion and ADT's
30 points total
Due 2/25/19

1. This problem considers two ways to compute x^n for some $n \geq 0$.
   a. Write an iterative method *power1* to compute x^n for $n \geq 0$.
   b. Write a recursive method power2 to compute x^n by using the following recursive formulation:

      $x^0 = 1$
      $x^n = x * x^{n-1}\ if\ n > 0$
   c. Write an accompanying main method which invokes both *power1* and *power2* for increasing values of n up to n = 16 (5 points).
2. The n^{th} Harmonic number is the sum of the reciprocals of the first *n* natural numbers:

$$H(n) = 1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \cdots + \frac{1}{n}$$

   Write a **recursive** method and accompanying main method to compute the n^{th} Harmonic number (5 points).

3. Design and implement an ADT named **CreditCard** that represents a credit card. The data of the ADT should include Java variables for the customer name, the account number, the next due date, the reward points, and the account balance. The initialization operation should set the data to client-supplied values. Include operations for a credit card charge, a cash advance, a payment, the addition of interest to the balance, and the display of the statistics of the account. Be sure to include a main class which creates an object from your **CreditCard** class. Do not worry too much about the correctness of the methods, the method headers and whether they are invoked correctly from client code is what really matters (20 points).