Vanier College
Computer Science Department

Programming 2

LAB 10

Q1: The Fibonacci series

0, 1, 1, 2, 3, 5, 8, 13, 21, …

begins with the terms 0 and 1 and has the property that each succeeding term is the sum of the two preceding terms. Write a recursive method Fibonacci(n) that computes Fibonacci number.

Q2: A savings account typically accrues savings using compound interest. If you deposit $1,000 with a 10% interest rate per year, then after one year you have a total of $1,100. If you leave this money in the account for another year at 10% interest, then after two years the total will be $1,210. After three years, you would have $1,331, and so on.

Write a program that inputs the amount of money to deposit, an interest rate per year, and the number of years the money will accrue compound interest. Write a recursive function that calculates the amount of money that will be in the savings account using the input information.
To verify your function, the amount should be equal to P(1 + i)^n, where P is the amount initially saved, i is the interest rate per year, and n is the number of years.

Q3: There are n people in a room, where n is an integer greater than or equal to 1. Each person shakes hands once with every other person. What is the total number, h(n), of handshakes? Write a recursive function to solve this problem. To get you started, if there are only one or two people in the room, then

handshake(1) = 0
handshake(2) = 1

If a third person enters the room, he or she must shake hands with each of the two people already there. This is two handshakes in addition to the number of handshakes that would be made in a room of two people, or a total of three handshakes.
If a fourth person enters the room, he or she must shake hands with each of the three people already present. This is three handshakes in addition to the number of handshakes that would be made in a room of three people, or six handshakes.
If you can generalize this to n handshakes, then it should help you write the recursive solution.

Q4: Consider a frame of bowling pins shown below, where each * represents a pin:

There are 5 rows and a total of 15 pins.
If we had only the top 4 rows, then there would be a total of 10 pins.
If we had only the top three rows, then there would be a total of six pins.
If we had only the top two rows, then there would be a total of three pins.
If we had only the top row, then there would be a total of one pin.

Write a recursive function that takes as input the number of rows n and outputs the total number of pins that would exist in a pyramid with n rows. Your program should allow for values of n that are larger than 5.