Work through the following sections. Seek assistance whenever needed. From http://schmidt.nuigalway.ie/cs102/python files with Python programs can be downloaded. Present your results to one of the demonstrators, so that a record of your achievements can be kept.

7. True or False?

1. A counted loop is designed to iterate a specific number of times.
2. In a flowchart, diamonds are used to show statements, and rectangles are used for decision points.
3. Information that is stored and manipulated on a computer is called data.
4. Since floating point numbers are extremely accurate, they should generally be used instead of ints.
5. Operations like addition and subtraction are defined in the `math` library.
6. The `sqrt` function computes the squirt of a number.
7. The int data type is identical to the mathematical concept of integer.
8. In Python, `4/5` is the same as `4.0/5.0`.

8. Multiple Choice.

1. The template `for <variable> in range(<expr>):` describes
   a) a general `for` loop b) an assignment statement
   c) a flowchart d) a counted loop
2. Which of the following is not a built-in operation?
   a) `+` b) `%` c) `abs()` d) `sqrt()`
3. In order to use functions in the `math` library, a program must include
   a) a comment b) a loop c) an operator d) an import statement

9. Programming Exercises.

1. Show the output from the following fragments.
   (a)
   ```
   for i in range(5):
       print i*i
   ```
   (b)
   ```
   for d in [3,1,4,1,5]:
       print d,
   ```
   (c)
   ```
   for i in range(4):
       print "Hello"
   ```
   (d)
   ```
   for i in range(5):
       print i, 2**i
   ```
2. Show the result of evaluating each expression. If the expression is illegal, explain why.
   (a) `4.0 / 10.0 + 3.5 * 2`

(b) `10 % 4 + 6 / 2`
(c) `abs(4 - 20 / 3) ** 3`
(d) `sqrt(4.5 - 5.0) + 7 * 3`

3. Translate each of the following mathematical expressions into an equivalent Python expression. You may assume that the `math` library has been imported.
   (a) $(3 + 4) \cdot 5$
   (b) $\frac{n(n-1)}{2}$
   (c) $4\pi r^2$
   (d) $\sqrt{r(\cos a)^2 + r(\sin a)^2}$
   (e) $\frac{y_2 - y_1}{x_2 - x_1}$
4. Show the list that is generated by each of the following expressions.
   (a) `range(5)`
   (b) `range(3, 10)`
   (c) `range(4, 13, 3)`
   (d) `range(15, 5, -2)`
   (e) `range(5, 3)`
5. Modify the `futval.py` program so that the number of years for the investment is also a user input. Make sure to change the final message to reflect the correct number of years.
6. Suppose you have an investment plan where you invest a certain fixed amount every year. Modify `futval.py` to compute the total accumulation of your investment. The inputs to the program will be the amount to invest each year, the interest rate, and the number of years for the investment.
7. As an alternative to APR, the interest accrued on an account is often described in terms of a nominal rate and the number of compounding periods. For example, if the interest rate is 3% and the interest is compounded quarterly, the account actually earns 3/4 % interest every 3 months.

   Modify the `futval.py` program to use this method of entering the interest rate. The program should prompt the user for the yearly rate (`rate`) and the number of times that the interest is compounded each year (`periods`). To compute the value in ten years, the program will loop `10 * periods` times and accrue `rate/period` interest on each iteration.
8. The Gregorian *epact* is the number of days between January 1st and the previous new moon. This value is used to figure out the date of Easter. It can be calculated by these formulas (where the symbol `/` stands for integer division and the symbol `%` for the remainder operation):

$$C = year/100$$
$$epact = (8 + (C/4) - C + ((8C + 13)/25) + 11(year \,\%\, 19)) \,\%\, 30$$

   Write a program that prompts the user for a 4-digit year and then outputs the value of the epact.