COMP 116   Data Structures

Lab #1

In this lab, we will practice the syntax for decisions and loops in C++. You can do all the exercises in a project called Lab01. Once you are done with an exercise, comment out all of its code (do not erase it, you may want to inspect it later) and write the code for the following exercise below the previous code. When you are done, submit the file containing all your code on onCourse.

1. A CS professor gives letter grades to his students according to the following table:

%	Grade
97-100	$A+$
93-96	A
90-92	$A-$
87-89	$B+$
83-86	B
80-82	$B-$
... all the way down to ...	
63-66	D
60-62	$D-$
< 60	F

   Write a programs that ask the user for a number between 0 and 100 (you can assume it is an integer) and display the corresponding grade. The program should display some kind of error message if the grade is not between 0 and 100.

2. Comment the code of the previous exercise (but you may want to copy-paste some of the code for this one).

   Modify the program above so that it is now repeated 5 times.

3. Comment the code of the previous exercise (but you may want to copy-paste some of the code for this one).

   Modify the program above so that it repeats until the user enters a negative number. An exit message, but *no error message* should be displayed when the user enters a negative number. The program should display an error message, but keep going if the number is greater than 100.

4. Comment all the code for the previous exercise, we are about to start something entirely new.

   Write a program which asks the user for a word (string) and displays the reversed string (characters in reverse order). You should do this by creating one string that contains the characters of the original string in reversed order, not by displaying on screen the characters one by one. To do this, you should inspect the original string one character at a time, and create a new string that has its characters reverse (I know that the string object has a method that can reverse the string for you, you should not use this for this exercise, you should do all the reversing on your own)

5. **Challenge** (to keep you busy if you go through all the previous exercises quickly): A real estate office handles N apartment units. When the rent is R dollars per month, all the units are occupied. However, for each increase in rent of I dollars per month, one unit becomes vacant. In addition, each rented unit requires on average M dollars of maintenance per month. What is the rent that will maximize the revenues?

   Write a program that prompts the user to enter:

   (a) The total number of units.
   (b) The rent at which all units would be occupied.
   (c) The increase in rent that results in one fewer unit being occupied.
   (d) The average amount to maintain a rented unit.

   The program should then output the number of units to be rented to maximize the revenues, and what that revenue will be.