

## LAB III

1. Assume that you want to generate a table of multiples of any given number. Write a program that allows the user to enter the number and then generates the table, formatting it into 10 columns and 20 lines. Interaction with the program should look like this (only the first three lines are shown):

Enter a number: 7

7	14	21	28	35	42	49	56	63	70
77	84	91	98	105	112	119	126	133	140
147	154	161	168	175	182	189	196	203	210

2. Write a temperature-conversion program that gives the user the option of converting Fahrenheit to Celsius or Celsius to Fahrenheit. Then carry out the conversion. Use floating-point numbers. Interaction with the program might look like this:

Type 1 to convert

2 to convert

Enter temperature

In Celsius that's

Fahrenheit to Celsius,

Celsius to Fahrenheit: 1

in Fahrenheit: 70

21.111111

3. Operators such as `>>`, which read input from the keyboard, must be able to convert a series of digits into a number. Write a program that does the same thing. It should allow the user to type up to six digits, and then display the resulting number as a type long

integer. The digits should be read individually, as characters, using cin object.

Constructing the number involves multiplying the existing value by 10 and then adding the new digit. (Hint: Subtract 48 or '0' to go from ASCII to a numerical digit.)

4. Write a program that calculates how much money you'll end up with if you invest an amount of money at a fixed interest rate, compounded yearly. Have the user furnish the initial amount, the number of years, and the yearly interest rate in percent. Some interaction with the program might look like this:

Enter initial amount: 3000

Enter number of years: 10

Enter interest rate (percent per year): 5.5

At the end of 10 years, you will have 5124.43 dollars. At the end of the first year you have  $3000 + (3000 * 0.055)$ , which is 3165. At the end of the second year you have  $3165 + (3165 * 0.055)$ , which is 3339.08. Do this as many times as there are years. A for loop makes the calculation easy.

5. Write a FACTOR program that it repeatedly asks for a number and calculates its factorial, until the user enters 0, at which point it terminates.

## Bonus Questions

1. Add column and row headers as well as separating lines to make it look like the following. Several additional loops are required to print the column header and horizontal separating lines. Don't try to make all of these additions at once. For example, first add the row header and vertical bars. Get that running then print the separating lines. Lastly add the column header. The order of these additions isn't important in this case, but to work on small increments in the program makes development to more easily.

1	2	3	4	5
1	1	2	3	4
2	2	4	6	8
3	3	6	9	12
4	4	8	12	16
5	5	10	15	20

2. Write a program in C++ which, given two integer inputs J and K, will output the combinations of J things partitioned into K groups. For example, if J = 5 and K = 3, the output would be:

(5,0,0)  
 (4,1,0)  
 (3,2,0)  
 (3,1,1)  
 (2,2,1)