SENG101 INTRODUCTION TO SOFTWARE PROGRAMMING

PRACTICE 1

4 November 2023

1. Write a single C++ statement to accomplish each of the following (assume that neither using declarations nor a using directive have been used):

a) Declare the variables c, thisIsAVariable, q76354 and number to be of type int (in one statement) and initialize each to 0.

b) Prompt the user to enter an integer. End your prompting message with a colon (:) followed by a space and leave the cursor positioned after the space.

c) Read an integer from the user at the keyboard and store it in integer variable age.

d) If the variable number is not equal to 7, print "The variable number is not equal to 7".

e) Print the message "This is a C++ program" on one line.

f) Print the message "This is a C++ program" on two lines. End the first line with C++.

g) Print the message "This is a C++ program" with each word on a separate line.

h) Print the message "This is a C++ program". Separate each word from the next by a tab.

2. Write a statement (or comment) to accomplish each of the following (assume that using declarations have been used for cin, cout and endl):

a) Document that a program calculates the product of three integers.

b) Declare the variables x, y, z and result to be of type int (in separate statements) and initialize each to 0.

c) Prompt the user to enter three integers.

d) Read three integers from the keyboard and store them in the variables x, y and z.

e) Compute the product of the three integers contained in variables x, y and z, and assign the result to the variable result.

f) Print "The product is " followed by the value of the variable result.

g) Return a value from main indicating that the program terminated successfully.

3.Using the statements you wrote in Exercise 2, write a complete program that calculates and displays the product of three integers. Add comments to the code where appropriate. [*Note:* You'll need to write the necessary using declarations or directive.]

4.Write four different C++ statements that each add 1 to integer variable x.

5.Write C++ statements to accomplish each of the following:

a) In one statement, assign the sum of the current value of x and y to z and post increment the value of x.

b) Determine whether the value of the variable count is greater than 10. If it is, print "Count is greater than 10".

c) Predecrement the variable x by 1, then subtract it from the variable total.

d) Calculate the remainder after q is divided by divisor and assign the result to q. Write this statement two different ways.

6.Write C++ statements to accomplish each of the following tasks.

a) Declare variable sum to be of type unsigned int and initialize it to 0.

b) Declare variable x to be of type unsigned int and initialize it to 1.

c) Add variable x to variable sum and assign the result to variable sum.

d) Print "The sum is: " followed by the value of variable sum.

7. Combine the statements that you wrote in Exercise 6 into a program that calculates and prints the sum of the integers from 1 to 10. Use the while statement to loop through the calculation and increment statements. The loop should terminate when the value of x becomes 11.

8.Write single C++ statements or portions of statements that do the following:

a) Input unsigned int variable x with cin and >>.

b) Input unsigned int variable y with cin and >>.

c) Declare unsigned int variable i and initialize it to 1.

d) Declare unsigned int variable power and initialize it to 1.

e) Multiply variable power by x and assign the result to power.

f) Pre-increment variable i by 1.

g) Determine whether i is less than or equal to y.

h) Output integer variable power with cout and <<.

9.Write a C++ program that uses the statements in Exercise 8 to calculate x raised to the y power. The program should have a while iteration statement.

10.*(Gas Mileage)* Drivers are concerned with the mileage obtained by their automobiles. One driver has kept track of several trips by recording miles driven and gallons used for each trip. Develop a C++ program that uses a while statement to input the miles driven and gallons used for each trip. The program should calculate and display the miles per gallon obtained for each trip and print the combined miles per gallon obtained for all tankfuls up to this point.

```
Enter miles driven (-1 to quit): 287
Enter gallons used: 13
MPG this trip: 22.076923
Total MPG: 22.076923
Enter miles driven (-1 to quit): 200
Enter gallons used: 10
MPG this trip: 20.000000
Total MPG: 21.173913
Enter the miles driven (-1 to quit): 120
Enter gallons used: 5
MPG this trip: 24.000000
Total MPG: 21.678571
Enter the miles used (-1 to quit): -1
```

11.(Credit Limits) Develop a C++ program that will determine whether a department-store customer has exceeded the credit limit on a charge account. For each customer, the following facts are available:

a) Account number (an integer)

b) Balance at the beginning of the month

c) Total of all items charged by this customer this month

d) Total of all credits applied to this customer's account this month

e) Allowed credit limit

The program should use a while statement to input each of these facts, calculate the new balance (= beginning balance + charges – credits) and determine whether the new balance exceeds the customer's credit limit. For those customers whose credit limit is exceeded, the program should display the customer's account number, credit limit, new balance and the message "Credit Limit Exceeded."

```
Enter account number (or -1 to quit): 100
Enter beginning balance: 5394.78
Enter total charges: 1000.00
Enter total credits: 500.00
Enter credit limit: 5500.00
New balance is 5894.78
Account: 100
Credit limit: 5500.00
Balance: 5894.78
Credit Limit Exceeded.

Enter account number (or -1 to quit): 200
Enter beginning balance: 1000.00
Enter total charges: 123.45
Enter total credits: 321.00
Enter credit limit: 1500.00
New balance is 802.45
Enter Account Number (or -1 to quit): -1
```

12. Write a C++ statement or a set of C++ statements to accomplish each of the following:

a) Sum the odd integers between 1 and 99 using a for statement. Use the unsigned int variables sum and count.

b) Print the value 333.546372 in a 15-character field with precisions of 1, 2 and 3. Print each number on the same line. Left-justify each number in its field. What three values print?

c) Calculate the value of 2.5 raised to the power 3 using function pow. Print the result with a precision of 2 in a field width of 10 positions. What prints?

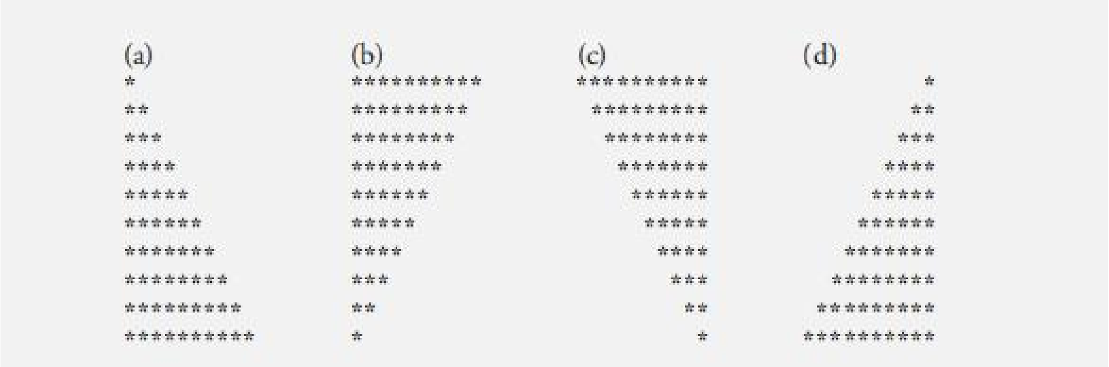
d) Print the integers from 1 to 20 using a while loop and the unsigned int counter variable x. Print only 5 integers per line. [*Hint:* When x % 5 is 0, print a newline character; otherwise, print a tab character.]

e) Repeat Exercise 12(d) using a for statement.

13.(Summing Integers) Write a program that uses a for statement to sum a sequence of integers. Assume that the first integer read specifies the number of values remaining to be entered. Your program should read only one value per input statement. A typical input sequence might be
5 100 200 300 400 500
where the 5 indicates that the subsequent 5 values are to be summed.

14.**(Averaging Integers)** Write a program that uses a for statement to calculate the average of several integers. Assume the last value read is the sentinel 9999. For example, the sequence 10 8 11 7 9 9999 indicates that the program should calculate the average of all the values preceding 9999.
15.
15.(Find the Smallest Integer) Write a program that uses a for statement to find the smallest of several integers. Assume that the first value read specifies the number of values remaining.

16.(Drawing Patterns with Nested for Loops) Write a program that uses for statements to print the following patterns separately, one below the other. Use for loops to generate the patterns. All asterisks (*) should be printed by a single statement of the form cout << '*'; (this causes the asterisks to print side by side). [Hint: The last two patterns require that each line begin with an appropriate number of blanks. Extra credit: Combine your code from the four separate problems into a single program that prints all four patterns side by side by making clever use of nested for loops.]



```
(a)               (b)               (c)               (d)
*                 **********        **********                 *
**                *********          *********                **
***               ********            ********               ***
****              *******              *******              ****
*****             ******                ******             *****
******            *****                  *****            ******
*******           ****                    ****           *******
********          ***                      ***          ********
*********         **                        **         *********
**********        *                          *        **********
```

17.(Calculating Total Sales) A mail order house sells five different products whose retail prices are: product 1 — $2.98, product 2—$4.50, product 3—$9.98, product 4—$4.49 and product 5— $6.87. Write a program that reads a series of pairs of numbers as follows:

a) product number

b) quantity sold

Your program should use a switch statement to determine the retail price for each product. Your program should calculate and display the total retail value of all products sold. Use a sentinel-controlled loop to determine when the program should stop looping and display the final results.