

**Engr 101**  
**Day 8**

**Sept. 9, 2019**

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**Practice Problems – Loops**

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1. Write a C console application to produce a multiplication table for x times y where x goes from 1 to lastX and y goes from 1 to lastY. Input lastX and lastY from the user. For example, your program output might look like this:

```
Enter the last value of x... 3
Enter the last value of y... 2
Multiplication table for x*y
1 * 1 = 1
1 * 2 = 2
2 * 1 = 2
2 * 2 = 4
3 * 1 = 3
3 * 2 = 6
```

2. Write a program to prompt the user to input a sequence of integers. Continue inputting integers until the user enters a zero. When the user enters a zero to indicate the end of the list your program should print the minimum and maximum integer and the average value of all of the integers entered. For example, your program output might look like this:

```
Enter an integer... 4
Enter an integer... 5
Enter an integer... 8
Enter an integer... 13
Enter an integer... 2
Enter an integer... 7
Enter an integer... 0
The maximum integer entered was 13.
The minimum integer entered was 2.
The average of all of the integers was 6.50.
```

3. Write a program to evaluate the equation  $y = 3x^3 + 2x^2 - 4x + 10$  for values of x starting at 0 and incrementing in steps of 0.1 until the value of y exceeds 1000. Print only the first value of x and the corresponding value of y for which y exceeds 1000.

4. Write a program consisting of 2 nested for loops that produces the following output line:  
000102101112202122

5. Write a program to using nested loops to print a table of all possible 4 bit binary numbers in order. Your output should look like this:

```
0000
0001
0010
0011
0100
0101
0110
0111
1000
```

1001  
1010  
1011  
1100  
1101  
1110  
1111

1. Write a program to print the digits 1 to 100 on successive lines.
2. Write a program to print only the even digits between 0 and 100 on successive lines.
3. Write a program to print all of the digits 0 to 100 on a single line.
4. Write a program to input a number  $n$  and print  $n!$  ( $n$  factorial).  $n! = n(n-1)(n-2)\dots(2)(1)$ . For example  $5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$ .
5. Write a program to evaluate the equation  $y = 3x^3 + 2x^2 - 4x + 10$  for values of  $x$  starting at  $-1$  and ending at  $1$  in steps of  $.01$ . Print all values of  $x$  and  $y$ .
6. Write a program to input a value  $k$  from the user and calculate  $y = \sum_{n=1}^k \frac{1}{n^2}$ .
7. Evaluate the equation given by  $y = x^2 - 6x + 5$  for values of  $x$  ranging from  $1 < x < 5$  in steps of  $0.01$ . Print only the smallest value of  $y$  and the corresponding value of  $x$ .
8. A user is entering values in sequence. Print only those values which are entered which are larger than any previously entered value. Terminate the program when the user enters a  $0$ .
9. If we list all the integers greater than  $0$  and below  $10$  that are multiples of  $3$  or  $5$ , we get  $3, 5, 6$  and  $9$ . The sum of these multiples is  $23$ . Find the sum of all the multiples of  $3$  or  $5$  below  $1000$ .  
**Hint: Check all numbers using the mod operator.**