

ECE 70 – Computational Programming for Engineers

Professor Kriehn – Fall 2016

Code Due By: Midnight on Tuesday, September 20, 2016

Writeup Due By: Class on Thursday, September 22, 2016

HOMEWORK #7 – Number Conversion Program

Write a program that reads an integer value between 0 – 255 entered by the user and displays the number in Decimal (Base 10), Octal (Base 8), and Binary (Base 2) formats.

Analysis:

To convert a decimal number to octal representation, use repeated division by 8. The remainders provide the octal digits (which will always be between 0 – 7), starting with the least significant octal digit. The final division by 8 produces the most significant octal digit. For example, the decimal number D254 produces an octal number O376.

To convert a decimal number to binary, use repeated division by 2. The remainders provide the binary digits (which will always be 0 or 1), starting with the least significant bit. The final division by 2 produces the most significant bit. For example, the decimal number D138 is B10001010 in binary.

Specifications:

The filename should be called **hw7.c**. First prompt the user to enter a number between 0 and 255, and use a semicolon ‘:’ at the end of the prompt. Scan in the decimal value as an integer. If the number is not between 0-255, print an error message. Otherwise, use the integer division and remainder operators to produce each digit in the octal and binary sequences. Print the results of the original decimal number, the converted octal digits, and the converted binary digits using appropriate output specifiers so 8 digits (with leading 0’s, if necessary), are displayed on the screen. In front of the decimal number include a ‘D’ and a space, in front of the octal number include an ‘O’ and a space, and in front of the binary number include a ‘B’ and a space. Use the tab character to justify each number so that they appear in an aligned column.

As an example, if you execute the program with the following underlined inputs, the output will be:

```
~> hw7.o  
Enter a number between 0 and 255: -37  
The number you entered was not between 0 and 255.
```

```
~> hw7.o  
Enter a number between 0 and 255: 138
```

```
Decimal:      D 00000138  
Octal:        O 00000212  
Binary:       B 10001010
```

Develop your I/O diagram and pseudocode, debug your code, and submit **hw7.c** to the Grader Program.

HOMework #8 – Pythagorean Theorem Calculator

Write a program that calculates the length c using the Pythagorean Theorem, where

$$c = (a^2 + b^2)^{1/2}$$

Specifications:

The filename should be called **hw8.c**. Prompt the user to enter **a** and **b**, using a comma between the two numbers, and scan in the result using pattern matching with the **scanf()** function. Use a semicolon **';** at the end of the prompt. Then calculate the length c using the **sqrt()** and **pow()** functions in the math library. Print the results for **a**, **b**, and **c** to the screen using **"%.2f"** format.

As an example, if you execute the program with the following underlined inputs, the output will be:

```
~> hw8.o  
Pythagorean Theorem Calculator
```

```
Enter "a,b": 3,4
```

```
a = 3.00  
b = 4.00  
c = 5.00  
~>
```

```
~> hw8.o  
Pythagorean Theorem Calculator
```

```
Enter "a,b": 13.2,7.6
```

```
a = 13.20  
b = 7.60  
c = 15.23  
~>
```

Develop your I/O diagram and pseudocode, debug your code, and submit **hw8.c** to the Grader Program.