(60-140) ASSIGNMENT 4

Due: 11:59pm, Nov. 17, 2017

1. **7.1** (p. 155) For each of the following integer constants, give its decimal value and show the expression of your calculation.

   (a) `077`

   (b) `0x77`

   (c) `0XABC`

2. **7.4*** (p. 157) Use the RAPTOR program to design an algorithm with flowchart that translates an alphabetic phone number saved in a character array into numeric form. A session using the program should have the following appearance if the array variable is assigned with a value of `"CALLATT"`.

   ```
   The translation of CALLATT is:  2233288
   ```

   For simplicity, the constant alphabetic phone number is assumed to consist of upper-case letters only. Save the flowchart in `a4_translate.rap`, and submit the file as your solution to this question.

   Hint: Use `length_of()` function to find the length of an array, and then go through array elements with a loop statement. In case you don't have a telephone nearby, here are the letters on the keys: 2=ABC, 3=DEF, 4=GHI, 5=JKL, 6=MNO, 7=PRS, 8=TUV, and 9=WXY.

3. **6.5** (p. 123) Produce a C program to implement the `a4_translate.rap` algorithm, with a requirement that the program must use a `switch` statement to implement the structure of nested `if` statements in the flowchart. Save the program in `a4_translate.c`, and submit this file as your solution to this question.

   Hint: Use `sizeof()` function to find the length of an array.

4. **8.7*** (p. 178) Define the initializer for the segments array (Exercise 6, p. 177), and then shrink the initializer as much as you can by using the shortcuts described in Section 8.2.

5. **8.7*** (p. 179) Use the RAPTOR program to design an algorithm with flowchart that prints the row sums and the column sums for a 5×5 initialized with random numbers between 0 and 23 inclusively. A session running the program should have the following appearance:

   ```
   row 1:  14 18 20 23 15
   row 2:  21 20 10 10 19
   row 3:  23 13 4 23 11
   row 4:  12 13 23 7 7
   row 5:  16 6 11 23 21
   Row totals:  90 80 74 62 77
   Column totals:  86 70 68 86 73
   ```

   It is suggested to use subcharts when printing out the row and column totals for improved readability. Save the flowchart in a file named as `a4_array_sums.rap`, and submit the file as your solution to this question.

6. **8.7** (p. 179) Produce a C program to implement the `a4_array_sums.rap` algorithm. In your implementation, special attention should be paid to make sure that loop structures in flowchart are mapped to the right loop statements in C. Save the program in a file named as `a4_array_sums.c`, and submit this file as your solution to this question.