(60-140) Lab Exercises #6

— Working with loops (Cont.)

October 30, 2017

1. RAPTOR: `loop` structures

   (a) Create a flowchart for a program that takes one integer `n` between 2 and 9 as input from the user. If the input is in range, the program prints `n` lines, each of which starts with a random number r_k in the range between 2 and 9, $k = n, n-1, \cdots, 1$. If r_k is closer to 0 than 10, the program prints $r_k - 1$ number of k, and then ends the current line immediately. Otherwise, it prints r_k number of spaces first and then print $10-r_k$ number of k before ending the current line. Typical samples of running the program are shown below.

```
Enter a number between 2 and 9: 9
9:          9
3: 88
4: 777
8:         66
6:       5555
7:        444
4: 333
4: 222
7:        111
```

```
Enter a number between 2 and 9: 2
4: 222
3: 11
```

```
Enter a number between 2 and 9: 5
5:      55555
2: 4
7:        333
7:        222
7:        111
```

```
Enter a number between 2 and 9: 7
3: 77
8:         66
5:      55555
4: 444
3: 33
5:      22222
5:      11111
```

   (b) For simplicity, it is assumed that the user input is always in range.

   (c) After trying out the flowchart with several numbers in range, save the modified flowchart to "`l6_numbers.rap`", and submit it online.

2. Algorithm implementation with C programming languages:

   (a) Implement the algorithm as represented by "l6_numbers.rap", and write an equivalent C program that not only accomplishes what the flowchart does but also follows the structure of the flowchart when choosing C loop statements.

   (b) Save your program to a file named "`l6_numbers.c`" in your working directory, and submit it online.

Evaluation: All online submissions must be completed before due time, which will be kept on record. In addition, every student is required to show/demonstrate his/her complete exercises to a GA/TA at the end of this lab, or at the beginning of the next lab after completing online submission. The demonstration includes showing the submitted flowchart and/or C codes, compiling the C program, and trying out the flowchart and C program with different input values. The maximum marks for this lab is 15, with 10 for the lab work (submission and demonstration) and 5 for lab attendance.