

(60-140) Lab Exercises #4

— Working with loops

October 16, 2017

1. Understand more about RAPTOR by watching the video clip about [how to work with loops](#).

2. RAPTOR: loop structures

- (a) Start RAPTOR with preloaded flowchart “l3_volume.rap” (Lab #3).
- (b) Modify the flowchart to enhance the functionality of the program so that the user is able to conduct many calculations until terminating the program with a ‘0’ for height. The modified flowchart keeps most of the original functionality of “l3 volume.rap”, except that **radius** is fixed at 5, and therefore there is no more need to input a value for **radius**. In addition, the flowchart finishes with a thank-you message as below after receiving an zero from the user:

```
Enter height (0 to exit program): 3.5
Height has to be bigger than radius (5.0).
```

```
Enter height (0 to exit program): 5.0
Height has to be bigger than radius (5.0).
```

```
Enter height (0 to exit program): 7
The volume is 549.78.
```

```
Enter height (0 to exit program): 6
The volume is 471.24.
```

```
Enter height (0 to exit program): 9.2
The volume is 722.57.
```

```
Enter height (0 to exit program): 0
Thank you for using my software.
```

- (c) Save the modified flowchart to “l4 volume.rap”, and submit it online.

3. Algorithm implementation with C programming languages:

- (a) Implement the algorithm as represented by “l4_volume.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 a C loop statement.
- (b) Save your program to a file named “l4_volume.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.