1 OPERATING SYSTEMS LABORATORY III - C Review II

1. Structures; A set of more variables grouped together for convenient handling.

   - code10.c

     ```c
     #include <stdio.h>
     #define PI 3.14
     typedef struct point {
       int x;
       int y;
     } Point;
     typedef struct circle {
       Point center;
       int radius;
     } Circle;
     double get_area(Circle *c);
     int main(int argc, char *argv[])
     {
       Point p;
       p.x = 3;
       p.y = 5;
       Circle *circle = (Circle *)malloc(sizeof(*circle));
       circle->center = p;
       circle->radius = 2;
       printf("center: (%d, %d), radius: %d)\nArea: %f\n",
       circle->center.x,circle->center.y,circle->radius, get_area(circle));
       return 0;
     }
     double get_area(Circle *c)
     {
       return 2*PI*c->radius;
     }
     ```

   - Analyze the code.
   - Execute the code. What is the output and why?
   - <u>Exercise:</u> Modify the code to;
     - add structure for a cylinder,
     - print out the volume of the cylinder.

2. File Input and Output; Examples on how to read from a file and write to a file.

   - code11.c and code12.c.
   - Analyze the code11.c and the output, do not forget also retrieve the file datafile.
   - Analyze the code12.c and the output, what is stored into file "output"?

3. **Assignment I** In this assignment, you're to sort a given multi-column unsorted integer file unsorted.txt.

- The first line of the file contains number of integers and number of columns.

- According to that information, write a complete C program to sort all the integers in a single-column format(to standart output, or directly to file).

- Which sorting algorithm?

Table 1: You should use the following sorting algorithms depending on the last digit of your Student ID.

Last Digit	Algorithm	Complexity
0-1	Bubble sort	$O(n^2)$
2-3	Heap sort	$O(nlogn)$
4-5	Insertion sort	$O(n^2)$
6-7	Merge sort	$O(nlogn)$
8-9	Quick sort	$O(nlogn)$

The last column is just given for information, not relevant for your assignment.

- You will be asked about your code during lab hour for grading.