Name:……..
ID:……

PART 1: LOC

Exercise 1: **Estimation for Function A**
Description:

```
include <stdio.h>
int main(void) {
   printf("Hello World");
   return 0;
}
```

How many LOC in this function (Conte)? 05

Exercise 2: **Estimation for Projects**

Project	LOC	People	Error	PP.Doc	Time	Effort	Quality	Document
A	15,000	3	135	356	1 month	5000	9	23.73
B	28,200	5	250	1232	2 month	2820	8.6	43.68
C	30,000	6	256	980	1.5 month	3333.33	8.5	32.66

Effort = LOC/(People*month) = 15000/3*1 = 5000

Quality = Error/KLOC = 135/15 = 9

Document = PP.Doc/KLOC = 356/15 = 23.73

Exercise 3: **Estimation for Projects**
Assuming

- Estimated project LOC = MSSV ***(VD: 1800234)***
- Organisational productivity (similar project type) = 620 LOC/p-m
- Burdened labour rate = 5000 $/p-m

Then

Effort = 1800234/620 = 2903.60 p-m

Cost per LOC = 5000/620 = (12.9) = 8 $/LOC

Project total Cost = 5000 * 2903.60 = 14518000 $

Exercise 4: **Estimation for Projects**

A system is composed of 7 subsystems as below.

Given for each subsystem the size in LOC and the 2 metrics: productivity LOC/pm (pm: person month), Cost $/LOC.

Calculate the system **total cost** in $ and **effort** in months .

Cost = (Estimated LOC) * ($/LOC) = 2340* 14 = 32760

Effort = (Estimated LOC) / (LOC/pm) = 2340/315 = 7.43

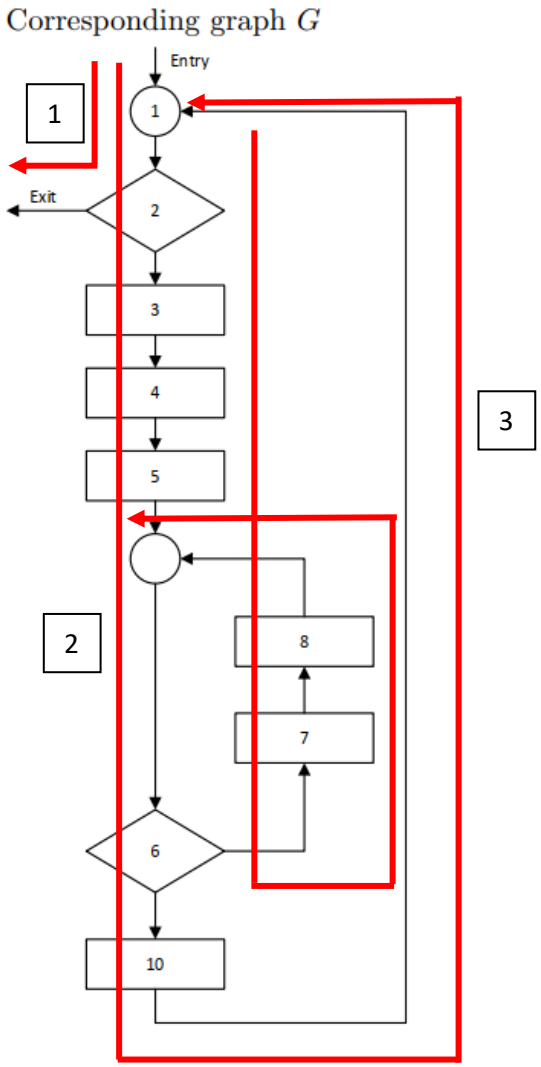
Function	estimated LOC	LOC/pm	$/LOC	Cost	Effort (months)
UICF	2340	315	14	32760	7.43
2DGA	5380	220	20	107600	24.45
3DGA	6800	220	20	136000	30.91
DSM	3350	240	18	60300	13.96
CGDF	4950	200	22	108900	24.75
PCF	2140	140	28	59920	15.29
DAM	8400	300	18	151200	28
Total				**656680**	**144.79**

PART 2: CYCLOMATIC COMPLEXITY

Code of Program

```
1  void insertionSort(int[] array) {
2    for (int i = 2; i < array.length; i++) {
3      tmp = array[i];
4      array[0] = tmp;
5      int j = i;
6      while (j > 0 && tmp < array[j-1]) {
7        array[j] = array[j-1];
8        j--;
9      }
10     array[j] = tmp;
11   }
12 }
```

1. Draw Corresponding graph G



2. Calculate Cyclomatic complexity

V(G) = P + 1 = 2 + 1 = 3

PART 3: COCOMO MODEL

Exercise 1: **Estimation for Projects**

Suppose a project was estimated to be 400 KLOC. Calculate the **effort** and **development time** for each of the three model i.e., organic, semi-detached & embedded.

(i)Organic Mode

$E = 2.4 * (400)^{1.05} = 1295.31$ PM

$D = 2.5 * (1295.31)^{0.38} = 38.07$ PM

(ii)Semidetached Mode

$E = 3.0 * (400)^{1.12} = 2462.79$ PM

$D = 2.5 * (2462.79)^{0.35} = 38.45$ PM

(iii) Embedded Mode

$E = 3.6 * (400)^{1.20} = 4772.81$ PM

$D = 2.5 * (4772.8)^{0.32} = 38$ PM

Exercise 2: **Estimation for Projects**

A project size of 200 KLOC is to be developed. Software development team has average experience on similar type of projects. The project schedule is not very tight. Calculate the **Effort**, **development time**, **average staff size**, and **productivity** of the project in semidetached mode.

$E=3.0*(200)^{1.12}=1133.12$PM

$D=2.5*(1133.12)^{0.35}=29.3$PM

$$\text{Average Staff Size (SS)} = \frac{E}{D} \text{ Persons}$$

$$= \frac{1133.12}{29.3} = 38.67 \text{ Persons}$$

$$\text{Productivity} = \frac{KLOC}{E} = \frac{200}{1133.12} = 0.1765 \text{ KLOC/PM}$$

$P = 176$ LOC/PM