Programming Lab Report

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Lab Week 9

Function[I]: Void & Value

Topic

- Functions
- Define Function
- Pass by value

Experiment I

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1 Problem description

- Write a function that shows a box.
- void drawBox(void)

```
************************
*                      *
*                      *
************************
```

- In function main, call function drawFigure() 3 times.

2 Program design

- In this experiment, we have to create function called "drawFigure" to draw 24x4 box.
- So first, we have to create the top off the box by loop print '*' 24 times.
- Then, for the middle part that have a hole by double loop. The first for loop for the height of the middle part and other loop is for the width of the middle part.
- For the bottom part, we will do the same like the top part.
- For main function, we will loop the drawFigure function 3 times.

Part 3: Program text is on the next page.

3 Program text

```c
#include <stdio.h>
int i;
int width = 24, height = 4;

void drawBox(){
    //Top part
    for (int i = 0; i < width; i++) {
        printf("*");
    }
    printf("\n");

    //Middle part
    for (int i = 0; i < height - 2; i++) {
        printf("*");
        for (int j = 0; j < width - 2; j++) {
            printf(" ");
        }
        printf("*\n");
    }

    //Bottom part
    for (int i = 0; i < width; i++) {
        printf("*");
    }
    printf("\n");
}

void main(){
    for (i = 0; i < 3; i++){
        drawBox();
    }
}
```

4 Terminal output

```
************************
*                      *
*                      *
************************
************************
*                      *
*                      *
************************
************************
*                      *
*                      *
************************
```

Experiment II

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1 Problem description

- Write a function that calculates area of a triangle.
- void calAreaTriangle(float width, float height)
- In function main, call function calArea Triangle() and verify the function.

2 Program design

- For this problem, the function have input 2 variable, width and height, and the function is void. That mean, it can't return the value out of the function.
- For calculate the area of triangle(A), we will use:

$$A = \frac{1}{2} \times w \times h$$

- for testing and compare to hand calculation, we will set width and height = 1.

3 Equation solve

First:

$$Let\ w\ and\ h\ = 1$$

Then insert into formula:

$$\begin{aligned} A &= \frac{1}{2} \times w \times h \\ &= \frac{1}{2} \times 1 \times 1 \\ &= \frac{1}{2} = 0.5 \end{aligned}$$

4 Program text

```c
#include <stdio.h>

void calAreaTriangle(float width, float height){
    float area = 0.5*width*height;
    printf("%f",area);
}

int main(){
    calAreaTriangle(1,1);
}
```

Part 5: Terminal output is on the next page.

5 Terminal output

```
0.500000
```

Experiment III

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1 Problem description

- Write a function that returns a grade.
- char grading(int score)

Score	Grade
85-100	A
70-84	B
55-69	C
0-54	F

- In function main, call function grading() and verify the function.

2 Program design

- The function will be [Note: For Invalid (I) is for double check if user input more than 100 or lower than 0]:

$$grading(x_{score}) = \begin{cases} I, & when\ x_{score} > 100\ or\ x_{score} < 0 \\ A, & when\ 85 \leq x_{score} \leq 100 \\ B, & when\ 70 \leq x_{score} \leq 84 \\ C, & when\ 55 \leq x_{score} \leq 69 \\ F, & when\ x_{score} < 54 \end{cases}$$

- In this case we have to use if condition to split case.
- For the function, we return the character from the function.

Part 3: Program text is on the next page.

3 Program text

```c
#include <stdio.h>
#include <stdlib.h>

char grading(int score){
    if (score > 100 || score < 0) {
        return 'I';
    } else if (score >= 85) {
        return 'A';
    } else if (score >= 70) {
        return 'B';
    } else if (score >= 55) {
        return 'C';
    } else {
        return 'F';
    }
}

int main(){
    printf("%c\n",grading(101));
    printf("%c\n",grading(rand() % 16 + 85));
    printf("%c\n",grading(rand() % 15 + 70));
    printf("%c\n",grading(rand() % 10 + 55));
    printf("%c\n",grading(rand() % 55));
    printf("%c\n",grading(-1));
}
```

4 Terminal output

```
I
A
B
C
F
I
```

Experiment IV

---

1 Problem description

- Write a function that gets weight of user.
- float getWeight(void)
- In function main, call function getWeight() and verify the function.

2 Program design

- In this problem we will get the value from user input that in the function.
- For testing, we will print the value from the function return.

3 Program text

```c
#include <stdio.h>

float getWeight(){
    float weight;
    scanf("%f", &weight);
    return weight;
}

int main(){
    printf("%.2f",getWeight());
}
```

4 Terminal output

```
55.2
55.20
```

End of Lab Experiment Week 9