



Computer Programming Language

【Fall, 2018】

Homework 1

Program A : Output to the console screen (25%)

Write a program that output a text drawing to the console screen as follows. You may also design your own drawing.

```
  /\_____\ /\
 /  0    0  \
(  ==  ^  == )
 )          (
(  NTU BIME )
(  ( )  ( ) )
(__(__)__(__)__)
```

Program B : Simple calculation (25%)

Study section 2.5 in our textbook and study the Program 2.7. Modify Program 2.7 to calculate the average of three numbers. Compile and run your program.

■ Web-Cat Submission Check:

```
double answer1; // Store the average of the three numbers in this global variable
```

Program C : Simple calculation (25%)

Study section 2.6 in our textbook and study the Program 2.11. Modify Program 2.11 to calculate the speed of a car whose received radar frequency is $2.00000035 \times 10^{10} \text{ sec}^{-1}$. Compile and run your program.

■ Web-Cat Submission Check:

```
double answer1; // Store the speed of the car in this global variable
```

Program D : Programming a mathematical formula (25%)

- a. The increase in length of a rectangular slab of metal that's fixed at one end and pulled by a force at its other end is given by this formula:

$$I = F \times k \times l / (w \times d \times \varepsilon)$$



I is the increase in length (mm).

F is the applied force ($N = \text{kg}\cdot\text{m}/\text{s}^2$).

k is 1000 (conversion of F to millimeter units).

l is the slab's length (mm).

w is the slab's width (mm).

d is the slab's depth (mm).

ε is the metal's modulus of elasticity (N/mm^2).

Given this information, design, write, compile, and run a C++ program to calculate the increase in length when a slab of aluminum that is 3 meters long, 4 cm wide, and 2 mm deep is subjected to a force of 4 Newtons. Aluminum's modulus of elasticity is $68,950 \text{ N}/\text{mm}^2$. (Hint: Make sure to convert the length and width to mm dimensions.) Verify the result produced by your program with a hand calculation.

- b. After verifying that your program is working correctly, use it to determine the increase in length for a slab of copper having the same dimensions as the aluminum slab described above. Copper's modulus of elasticity is $110,000 \text{ N}/\text{mm}^2$.

■ *Web-Cat Submission Check:*

```
double answer1; // Store the calculated increase in length for the aluminum slab
double answer2; // Store the calculated increase in length for the copper slab
```

Notes:

1. Please submit your programs (source codes) to the Web-CAT grading system website (http://140.112.94.129:8080/Web-CAT_1.4.0/WebObjects/Web-CAT.woa/) before **Sept. 27** (3:30PM)

2. File naming convention for your programs should be as follows:

```
HW01AB07611050.CPP
HW01AB07611050.EXE
```

where **HW01A** represents the homework number (01, 02, 03, etc.) and which program (A, B, C, etc.) of that homework. The **B07611050** code represents your student ID.

3. Make sure to provide header comments at the beginning of your program. The header should look like this:



```
//=====
// PROGRAMMER : Your name here
// DATE       : 2018-09-25
// FILENAME    : HW01AB07611050.CPP
// DESCRIPTION : This is a program to compute the average of three integers
//=====
```

4. Late submission will have a penalty of 10% discount per day of your grade toward a minimum score of 60. No late submission over a week will be accepted.
5. Criteria of grading include: (1) Program functionality; (2) User interface; (3) Structure of the program; (4) Suitable comments; (5) Programming style; (6) Creativity.