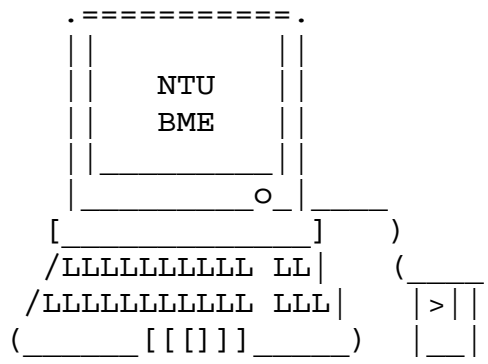
Computer Programming Language

【Fall, 2020】

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 ASCII art drawing.



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 sum and average of the three floating-point numbers. Compile and run your program. Note that the three numbers are input by the user.

■ *Sample Input/Output*

input	6.3 20.6 12.1
output	The sum of the three numbers is 39.0. The average of the three numbers is 13.0.

■ *AUTOLAB Submission Check:*

```
double answer1;   // Store the sum of the three numbers in this global variable
double answer2;   // 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 determine

the frequency returned by a car traveling at 55 mph. Your program should produce the following display (replacing the underlines with the value your program calculates):

```
The returned frequency corresponding to 55 mph is _______
```

■ *Sample Input/Output*

input	55
output	The returned frequency for 55 mph is _____ Hz

■ *AUTOLAB Submission Check:*

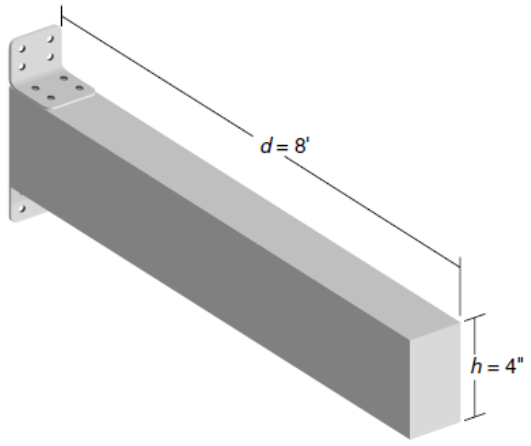
```
double answer1;    // Store the frequency corresponding to 55 mph in this global variable
```

Program D： Programming a mathematical formula (25%)

The maximum load that can be placed at the end of a symmetrical wooden beam, such as the rectangular beam shown in the following figure, can be calculated as the following:

$$L = \frac{S \times I}{d \times c}$$

L is the maximum weight in lbs of the load placed on the beam.
S is the stress in lbs/in^2.
I is the beam's rectangular moment of inertia in units of in^4.
d is the distance in inches that the load is placed from the fixed end of the beam (the "moment arm").
c is one-half the height in inches of the symmetrical beam.



For a 2" × 4" wooden beam, the rectangular moment of inertia is given by this formula:

$$I = \frac{base \times height^3}{12} = \frac{2 \times 4^3}{12}$$

c = ½(4 in) = 2 in

Given this information, design, write, compile, and execute a C++ program that computes the maximum load in lbs that can be placed at the end of an 8-foot 2" × 4" wooden beam so that the stress on the fixed end is 3000 lb/in^2.

■ *Sample Input/Output*

input	`8.0 2.0 4.0 3000.0`
output	`The maximum load is _____ lbs.`

- The input sequence is distance (d), base, height, and stress (S), respectively.

■ *AUTOLAB Submission Check:*

```
double answer1;     // Store the value of the maximum load in lbs in this global variable
```

Notes:

1. Please submit your programs (source codes) to the AUTOLAB grading system website (http://140.112.183.225) before **Oct. 1** (3:30PM)

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

   HW01AB09611050.CPP
   HW01AB09611050.EXE

   where HW01A represents the homework number (01, 02, 03, etc.) and which program (A, B, C, etc.) of that homework. The B09611050 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       : 2020-10-01
//  FILENAME   : HW01AB09611050.CPP
//  DESCRIPTION: This is a program to compute the sum and average
//               of three integers
//=============================================================
```

4. Late submission will have a penalty of 10% discount per day of your homework total score toward a maximum of 50% discount. No late submission over five days 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.