

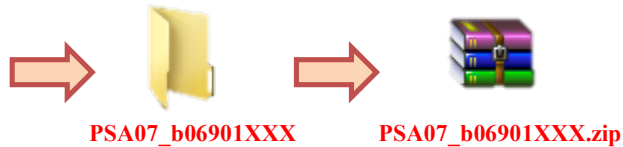
# Programming Session Assignment 07

2017/11/21 by TA 陳姿玲

## REQUIRED FILES

Please **compress a folder** named **PSA07\_b06901XXX** (student ID) that contains the following files:

- ✓ b06901XXX\_p1.cpp
- ✓ b06901XXX\_p2.cpp
- ✓ b06901XXX\_p3.cpp
- ✓ b06901XXX\_p4.cpp



**Do not submit executable files (.exe).** Files with names in wrong format will not be graded. In your .cpp files, we suggest you write comments in details as much as you can. It will be good for TAs to read your code and for your future reference and maintenance. (Due date: 11/22 06:00)

## PROBLEM DESCRIPTION

1. Design a program that input an integer value “A” and output the answer that is the smallest value greater than 10 times of the value “A” using the following formula.

$$\text{Answer} = A + (A + 1) + (A + 2) + (A + 3) + \dots$$

Note:

- ✓ Call a non-recursive **function** repeatedly in a loop to calculate the answer.
- ✓ There should be a **static variable** “answer” in the **function**.

Format:

Input: (A)

Output: (answer)

10

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2. Design a program that accepts **three variables** of the same type, including type **"int"** and **"double"**, and output values as the following formula.

$$Value = \sqrt{a \times b \times c}$$

Note:

- ✓ Write **two functions** with **same function name** to calculate and output the value respectively. It is also okay to use function template if you wish.
- ✓ Output the value up to **the first** digit after the decimal point

Format:

Example:

```
2 4 5
6.3
3.5 6.4 7.2
12.7
```

Input: (three variables with type int, three variables with type double )

```
2 4 5
```

```
3.5 6.4 7.2
```

Output:

```
6.3
```

```
12.7
```

3. Design a program that inputs the radius of the face, the radius of eyes, and the side length of the triangular mouth with type “double”, and outputs the blue area as the following format.

Note:

- ✓ Use functions to calculate the area of the circle and the triangle  
Ex: eye = Area\_Circle(radius); mouth= Area\_Triangle(side);
- ✓ Output the value up to the second digit after the decimal point
- ✓  $\pi = 3.14$  and triangle area =  $\frac{\sqrt{3}}{4}x^2$ , where  $x$  is the side length of the triangle

Format:

Input: (the radius of the face, the radius of the eyes, the side length of the triangular mouth)

```
5.7 2.3 1
```

Output: (the blue area of the face)

```
68.36
```



Remember that the face can't be composed of wrong values, which means that the total area of eyes and the mouth should not be greater than (or equal to) the face. Your program needs to ask the user to input again if the input is wrong as the following example.

Example:

```
1.0 2.5 3.0
Are you sure it's a face !?
Please input again!
5.7 2.3 1
68.36
```

Input:

```
1.0 2.5 3.0
```

```
5.7 2.3 1
```

Output:

```
Are you sure it's a face !?
Please input again!
```

```
68.36
```

4. Binary Search is one of the search algorithms in the computer science. At each step, the algorithm compares the median value in the search sequence to the target value that you want to find. Based on the comparison and the sorted sequence, it can then eliminate half of the search space. By doing this repeatedly, the search sequence will eventually be a single element, which is the target value. For example: sequence=[1,2,3,4,5,6], target value=4

Step1:

search sequence = [1,2,3,4,5,6]

median value = 3 (index = 2)

target value > median value

set search sequence = [4,5,6]



Step2:

search sequence = [4,5,6]

median value = 5 (index=4)

target value < median value

set search sequence = [4]



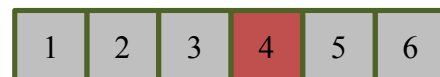
Step3:

search sequence = [4]

median value = 4 (index=3)

target value = median value

return the index of the median value = 3



Design a program that input the sequence size, the sorted sequence, and the target value with type "int", "double", "double", then output the index of the target value.

Note: Use a recursive function to search the index of the target value

Ex: index= BinarySearch ( \*Sequence, LowestIndexOfSequence, HighestIndexOfSequence, TargetValue);

Format:

Input: (the sequence size, the sorted sequence, the target value)

```
5
1.2 2.3 3.4 4.5 5.6
5.6
```

Output: (the index of the target value)

```
4
```