Computer Programming Language

【Fall, 2018】

Homework 2

Program A： Simple arithmetic calculation (25%)

Write a program that inputs three integers from the keyboard and show the sum, average, product, smallest and largest of these numbers. The screen dialog should appear as following example:

```
Input three different integers: 13  27  17
Sum is 57
Average is 19
Product is 5967
Smallest number is 13
Largest number is 27
```

■ *Web-Cat Submission Check:*

```
int answer1;    // Store the sum of the three input integers
int answer2;    // Store the smallest number of the three input integers
int answer3;    // Store the largest number of the three input integers
```

Program B： Bowling score calculation (25%)

The rules of bowling are that if the first throw is a strike (all 10 pins knocked down), then the score is equal to those 10 points plus the number knocked down in the next two throws. Thus the maximum score (three strikes) is 30. If the first throw knocks down fewer than 10 pins, but the second throw knocks down the remainder of the 10 pins (a apre), then the score is those 10 points plus the number of pins knocked down on the third throw. If the first two rows fail to knock down all of the pins (a blow), then the score is just the total number of pins knocked down in the first two throws.

Write a program that takes three input numbers representing the number of pins knocked down by a bowler in three throws. Calculate and output the score, an also check for erroneous input. For example, a throw must be in the range of 0 through 10 pins, and the total of the first two throws must be less than or equal to 10, except when the first throw is a strike. Be sure to use proper formatting and appropriate comments in your code. The output should be formatted neatly, and the error messages should be clear and informative.

■ *Web-Cat Submission Check:*

```
int answer1;    // Store the score of the three throws
```

Program C： Solving quadratic equation (25%)

Given a quadratic equation as follows:

$$ax^2 + bx + c = 0$$

Solve for the roots of the equation using the following formula:

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Be sure to verify that it is a valid quadratic equation by checking *a* to make sure it is not zero. If it is zero, display an appropriate error message. Also, if the discriminant – the expression in the square root – is less than zero, display an error message stating that the roots will be complex and display the complex roots. If the discriminant is zero, the roots will be the same, so display the root and the fact that the roots are identical. If the discriminant is greater than zero, display the two real roots.

■ *Web-Cat Submission Check:*

double answer1; // Store the value of the discriminant $b^2 - 4ac$

Program D：Game of blackjack (25%)

In the game of blackjack, the cards 2 through 10 are counted at their face values, regardless of suit; all face cards (jack, queen, and king) are counted as 10; and an ace is counted as a 1 or 11, depending on the total count of all cards in a player's hand. The ace is counted as 11 only if the resulting total value of all cards in a player's hand doesn't exceed 21; otherwise, it's counted as 1. Using this information, write a C++ program that accepts three card values as inputs (a 1 corresponding to an ace, a 2 corresponding to a two, and so on), calculates and display the total value of the hand, and the sum of the three cards.

■ *Web-Cat Submission Check:*

int answer1; // Store the total value of the hand
int answer2; // Store the sum of the three cards

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 **Oct. 11**. (3:30PM)

2. 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.

3. Criteria of grading include: (1) Program functionality; (2). User interface; (3). Structure of the program; (4). Suitable comments; (5). Programming style; (6). Creativity.