

TK1914 C++ Programming

Lab: User-Defined Functions II

Each question below concerns a particular program whose description is provided. You are also provided with a skeletal code of the program. Complete the program by filling in the empty boxes. You should not change other parts of the program code. Test the program to ensure that it runs according to its description.

1. Program Description

This program displays textual triangular shapes based on the height, character and quantity inputted by the user.

Sample Execution

```
Enter height: 4
Enter number of triangles: 2
Enter character: *
*
**
***
****
*
**
***
****
```

Skeletal Code

```
#include <iostream>
using namespace std;
[ ]

int main() {
    int num, height;
    char ch;
    cout << "Enter height: ";
    cin >> height;
    cout << "Enter number of triangles: ";
    cin >> num;
    cout << "Enter character: ";
    cin >> ch;
    for (int i=0; i < num; i++)
        drawTriangle(height, ch);
}

[ ] drawTriangle([ ]) {
    [ ]
}

}
```

2. Program Description

This program inputs a positive integer from the user. It then displays the sum of the digits that make up the inputted number. For example, if the user inputs the number 54736 then the program will display the sum of 5, 4, 7, 3 and 6 i.e. 25.

Sample Execution

```
Enter number: 43821976
Sum of digits: 40
```

Skeletal Code

```
#include <iostream>
using namespace std;
[ ]

int main() {
    int num;
    cout << "Enter number: ";
    cin >> num;
    if (num > 0)
        cout << "Sum of digits: " << sumOfDigits(num);
}

[ ] sumOfDigits( [ ] ) {
    [ ]
}
}
```

3. Program Description

An integer P is called a prime number if the only positive integers that divide P are 1 and P itself. This program inputs a positive integer N and then displays a message stating whether N is a prime number or not.

Sample Execution

```
Enter number: 17
17 is a prime number
```

Skeletal Code

```
#include <iostream>
using namespace std;
[ ]
int main() {
    int num;
    cout << "Enter number: ";
    cin >> num;
    if (isPrime(num))
        cout << num << " is a prime number";
    else
        cout << num << " is not a prime number";
}
[ ] isPrime( [ ] ) {
    [ ]
}
}
```

4. Program Description

This program inputs a time value (in 24-hour format) and a duration (in minutes). It then calculates and displays the time (in 24-hour format) after that duration. The program must also be able to detect invalid time values. Examples of such values are 274, 2832 and -125.

Sample Execution 1

```
Enter time: 2245
Enter duration: 195
Time after duration: 200
```

Sample Execution 2

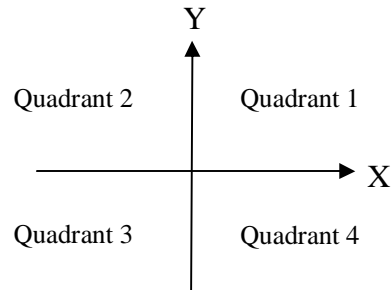
```
Enter time: 2278
Enter duration: 195
Invalid input
```

Skeletal Code

```
#include <iostream>
using namespace std;
[ ]
int main() {
    int time, duration, endTime;
    cout << "Enter time: ";
    cin >> time;
    cout << "Enter duration: ";
    cin >> duration;
    endTime = calcTime(time, duration);
    if (endTime == -1)
        cout << "Invalid input";
    else
        cout << "Time after duration: " << endTime;
}
[ ] calcTime( [ ] ) {
    [ ]
}
}
```

5. Program Description

This program inputs the X and Y coordinates of a point and then displays a message stating whether the point is on one of the axes or in one of the four quadrants as illustrated below.



Sample Execution 1

```
Enter x: 4
Enter y: 2
Quadrant: 1
```

Sample Execution 2

```
Enter x: 4
Enter y: 0
On the x-axis or y-axis
```

Skeletal Code

```
#include <iostream>
using namespace std;
[ ]

int main() {
    int x, y, quadrant;
    cout << "Enter x: ";
    cin >> x;
    cout << "Enter y: ";
    cin >> y;
    quadrant = getQuadrant(x, y);
    if (quadrant == 0)
        cout << "On the x-axis or y-axis";
    else
        cout << "Quadrant: " << quadrant;
}

[ ] getQuadrant([ ]) {
    [ ]
}

}
```