Chapter 5 Smith Exercises & Labs

Exercise 5-1.

1. x = 6;
   y = ++x;
   After this code executes, what is the value of **x** and **y**?
   x = 7
   y = 7

2. x = 6;
   y = x++;
   After this code executes, what is the value of **x** and **y**?
   x = 7
   y = 6

3. x = 6;
   y = --x;
   After this code executes, what is the value of **x** and **y**?
   x = 5
   y = 5

4. x = 6;
   y = x--;
   After this code executes, what is the value of **x** and **y**?
   x = 5
   y = 6

Exercise 5-2.

1. What is the loop control variable? What is the sentinel value?
   Variable is numTimes, sentinel value is 8

2. What is the output?
   There is no output because numTimes can never be less than NUM_LOOPS

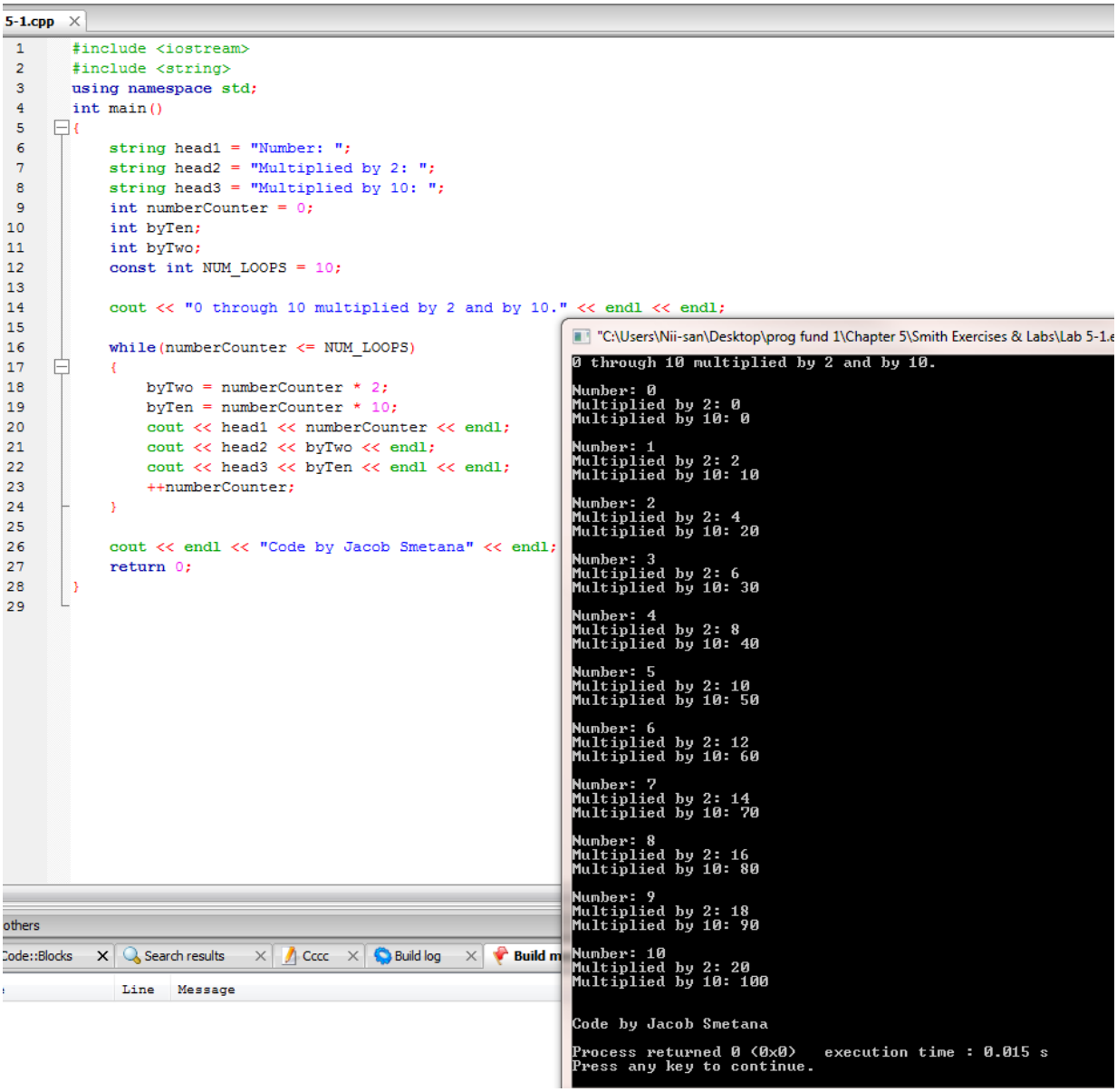
3. What is the output if the code is changed to **while(numTimes++ <= NUM_LOOPS)**?
   Value of numTimes is 9

4. What is the output if the code is changed to **while(++numTimes <= NUM_LOOPS)**?
   There is no output because numTimes can never be less than or equal to NUM_LOOPS

Exercise 5-3.

1. What is the value of **number1** when the loop exits?
   6
2. What is the value of **number2** when the loop exits?
   21
3. If the statement **number1++** is changed to **++number1**, what is the value of **number1** when the loop exits?
   6
4. What could you do to force the value of **number2** to be **21** when the loop exits?
   Make number2 = 21

Lab 5-1.



Exercise 5-4.

1. What is the output if the user enters a **3**?
   Page Number 1
   Page Number 2
   Page Number 3
   Value of counter is 4

2. What is the problem with this code, and how can you fix it?
   The counter variable ends as one more than the total number of pages to print.
   Add **counter--** after the while loop

3. Assuming you fix the problem, if the user enters **50** as the number of pages to print, what is the value of **counter** when the loop exits?
   50

4. Assuming you fix the problem, if the user enters **0** as the number of pages to print, how many pages will print?
   0

5. What is the output if the curly braces are deleted?
   Deleting the curly braces results in an infinite loop unless 0 is entered instead.

Lab 5-2.

5-2.cpp

```cpp
#include <iostream>
#include <string>
using namespace std;

int main()
{
    double numStars = 0;
    double averageStars;
    double totalStars = 0;
    int numPatrons = 0;

    while(numStars >= 0)
    {
        ++numPatrons;
        cout << "Enter rating for featured movie: ";
        cin >> numStars;
        totalStars += numStars;
    }

    averageStars = (totalStars - numStars) / (numPatrons - 1);

    cout << endl << "Average Star Value: " << averageStars << endl << endl;
    cout << endl << "Code By Jacob Smetana"<< endl;
    return 0;
}
```

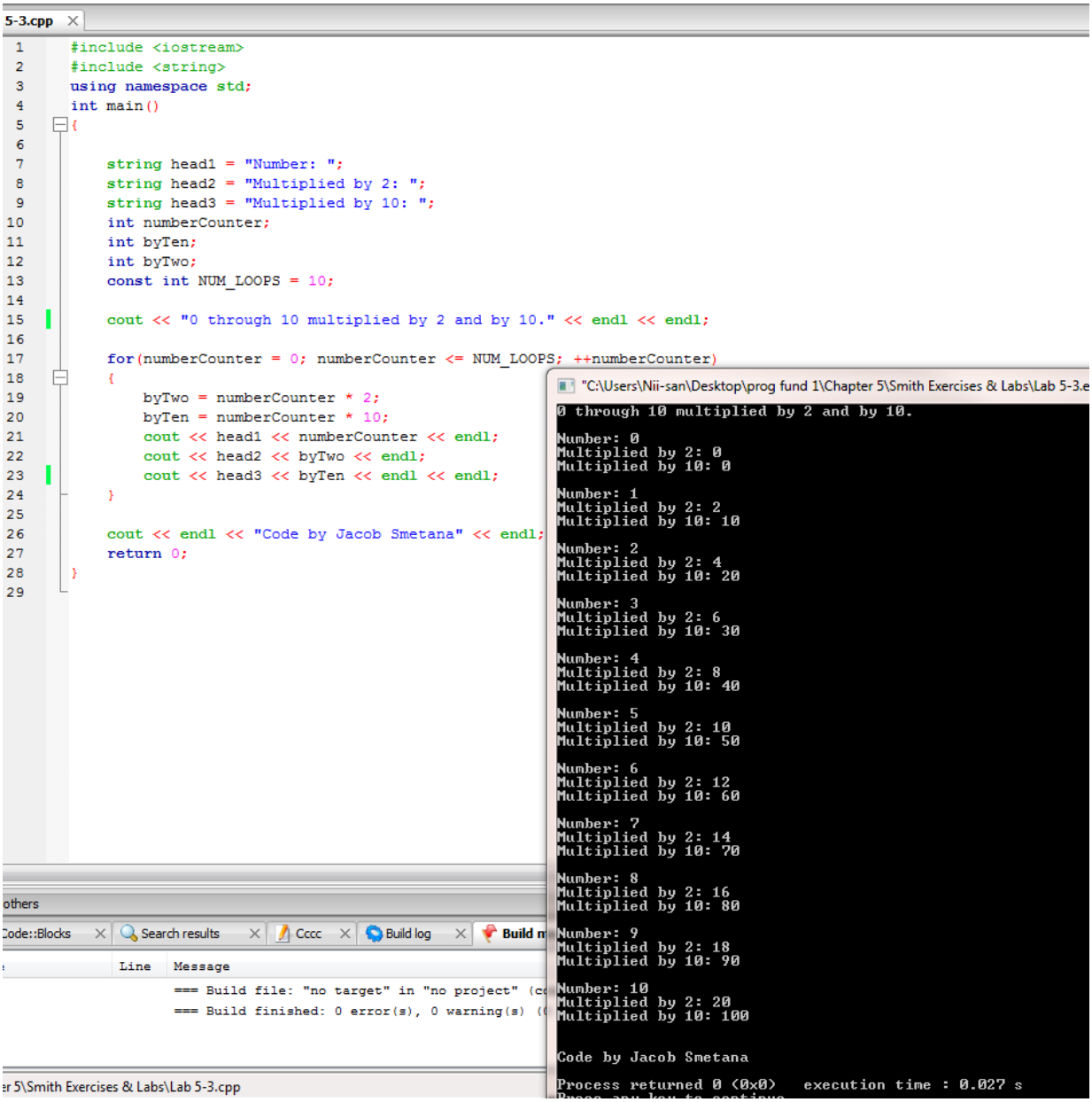
"C:\Users\Nii-san\Desktop\prog fund 1\Chapter 5\Smith Exercises & Labs\Lab 5-2.exe"

```
Enter rating for featured movie: 0
Enter rating for featured movie: 3
Enter rating for featured movie: 4
Enter rating for featured movie: 4
Enter rating for featured movie: 1
Enter rating for featured movie: 1
Enter rating for featured movie: 2
Enter rating for featured movie: -1

Average Star Value: 2.14286


Code By Jacob Smetana

Process returned 0 (0x0)   execution time : 7.345 s
Press any key to continue.
```

Exercise 5-5.

1. <u>The loop executes 12 times.</u>
   False
2. <u>This loop could be written as a **while** loop.</u>
   True
3. <u>Changing the **<=** operator to **<** will make no difference in the output.</u>
   True
4. <u>This loop executes 6 times.</u>
   True

Lab 5-3.



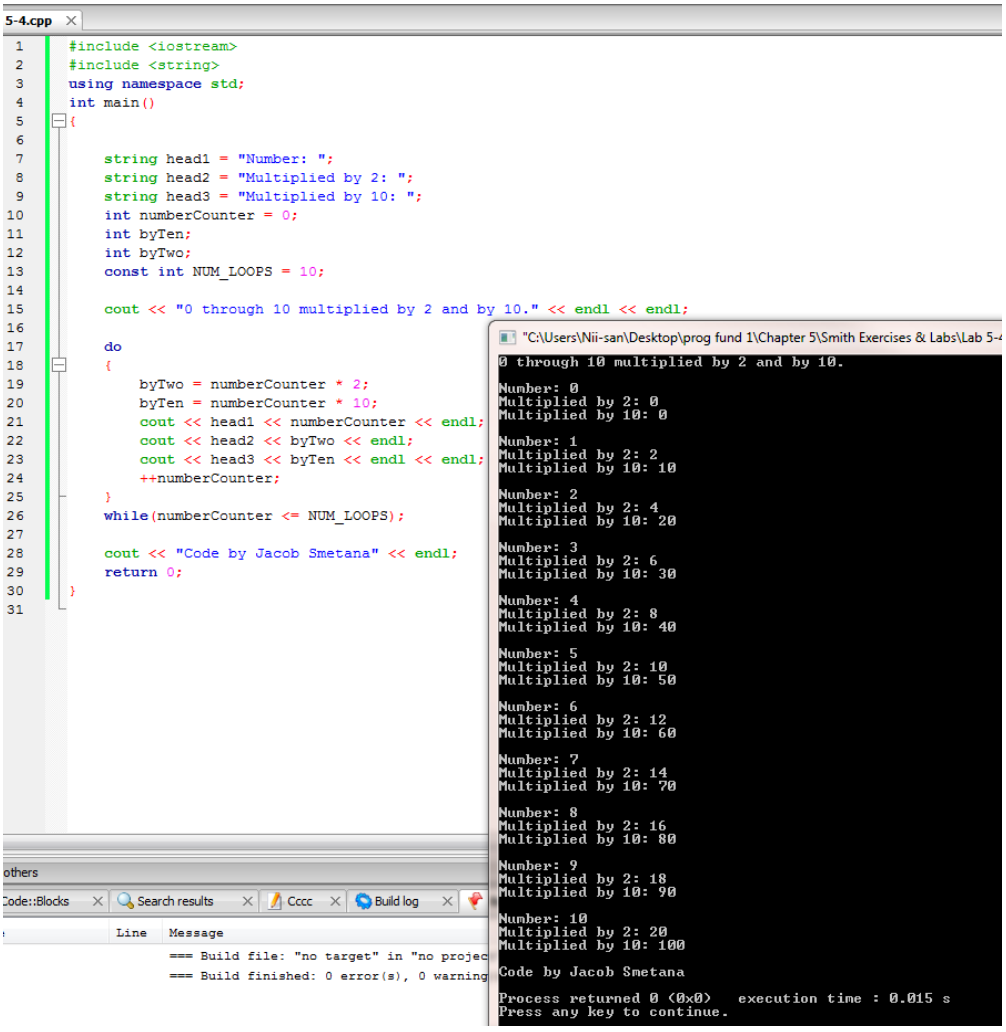
```cpp
#include <iostream>
#include <string>
using namespace std;
int main()
{

    string head1 = "Number: ";
    string head2 = "Multiplied by 2: ";
    string head3 = "Multiplied by 10: ";
    int numberCounter;
    int byTen;
    int byTwo;
    const int NUM_LOOPS = 10;

    cout << "0 through 10 multiplied by 2 and by 10." << endl << endl;

    for(numberCounter = 0; numberCounter <= NUM_LOOPS; ++numberCounter)
    {
        byTwo = numberCounter * 2;
        byTen = numberCounter * 10;
        cout << head1 << numberCounter << endl;
        cout << head2 << byTwo << endl;
        cout << head3 << byTen << endl << endl;
    }

    cout << endl << "Code by Jacob Smetana" << endl;
    return 0;
}
```

```
"C:\Users\Nii-san\Desktop\prog fund 1\Chapter 5\Smith Exercises & Labs\Lab 5-3.e
0 through 10 multiplied by 2 and by 10.

Number: 0
Multiplied by 2: 0
Multiplied by 10: 0

Number: 1
Multiplied by 2: 2
Multiplied by 10: 10

Number: 2
Multiplied by 2: 4
Multiplied by 10: 20

Number: 3
Multiplied by 2: 6
Multiplied by 10: 30

Number: 4
Multiplied by 2: 8
Multiplied by 10: 40

Number: 5
Multiplied by 2: 10
Multiplied by 10: 50

Number: 6
Multiplied by 2: 12
Multiplied by 10: 60

Number: 7
Multiplied by 2: 14
Multiplied by 10: 70

Number: 8
Multiplied by 2: 16
Multiplied by 10: 80

Number: 9
Multiplied by 2: 18
Multiplied by 10: 90

Number: 10
Multiplied by 2: 20
Multiplied by 10: 100


Code by Jacob Smetana

Process returned 0 (0x0)   execution time : 0.027 s
```

Exercise 5-6.

1. How many times does this loop execute?
   3 times
2. What is the output of this program?
   Strike 1
   Strike 2
   Strike 3
3. Is the output different if you change the order of the statements in the body of the loop, so that **counter++** comes after the output statement?
   Yes. The output becomes: Strike 0
   Strike 1
   Strike 2
4. What is the loop control variable?
   counter

Lab 5-4.



Exercise 5-7.

1. How many times does the outer loop execute?
   5 times
2. How many times does the inner loop execute?
   7 times
3. What is the value of **sum** printed by **cout**?
   175
4. What would happen if you changed **rows++** and **columns++** to **++rows** and **++columns**?
   Nothing changes

Lab 5-5.

cise 5-4.cpp | **Lab 5-5.cpp**

```cpp
#include <iostream>
#include <string>
using namespace std;
int main()
{
    const int NUM_ACROSS = 3;
    const int NUM_DOWN = 5;
    int row;
    int column;

    for(row = 1; row <= NUM_DOWN; ++row)
    {
        for(column = 1; column <= NUM_ACROSS; ++column)
        {
            if(row != 2 && row != 4)
            {
                cout << "*";
            }
            else
            {
                if(column == 1)
                {
                    cout << "*";
                }
                else
                {
                    cout << " ";
                }
            }
            if(column == NUM_ACROSS)
            {
                cout << endl;
            }
        }
    }
    cout << endl;
    cout << "Code by Jacob Smetana" << endl;
    return 0;
}
```

"C:\Users\Nii-san\Desktop\prog fund 1\Chapter 5\Smith Exercises & Labs\Lab 5-5.

```
***
*
***
*
***

Code by Jacob Smetana

Process returned 0 (0x0)   execution time : 0.005 s
Press any key to continue.
```

Lab 5-5 Step 7.

5-5.cpp

```cpp
#include <iostream>
#include <string>
using namespace std;
int main()
{
    const int NUM_ACROSS = 5;
    const int NUM_DOWN = 7;
    int row;
    int column;

    for(row = 1; row <= NUM_DOWN; ++row)
    {
        for(column = 1; column <= NUM_ACROSS; ++column)
        {
            if(row == 1 || row == 4 || row == 7)
            {
                cout << "*";
            }
            else
            {
                if(column == 1)
                {
                    cout << "*";
                }
                else
                {
                    cout << " ";
                }
            }
            if(column == NUM_ACROSS)
            {
                cout << endl;
            }
        }
    }
    cout << endl;
    cout << "Code by Jacob Smetana" << endl;
    return 0;
}
```

```
"C:\Users\Nii-san\Desktop\prog fund 1\Chapter 5\Smith Exercises & Labs\Lab 5-5.
*****
*
*
*****
*
*
*****

Code by Jacob Smetana

Process returned 0 (0x0)   execution time : 0.010 s
Press any key to continue.
```

Exercise 5-8.

1. What happens when you compile this program if the variable **sum** is not initialized with the value **0**?
   Nothing changes

2. Could you replace **sum += rainfall;** with **sum = sum + rainfall;** ?
   Yes, you could

3. The variables **sum**, **rainfall**, and **average** should be declared to be what data type to calculate the most accurate average rainfall?
   double

4. Could you replace **DAYS_IN_WEEK** in the statement **average = sum / DAYS_IN_WEEK;** with the variable named **counter** and still get the desired result? Explain.
   You would not get the desired result because **counter** would equal **8** at the end of the program.

Lab 5-6.

5-6.cpp

```cpp
// Input:  L for left-handed; R for right handed; X to quit.
#include <iostream>
#include <string>
using namespace std;
int main()
{
    string leftOrRight = "";
    int rightTotal = 0;
    int leftTotal = 0;

    cout << "Enter an L if you are left-handed,";
    cout << " an R if you are right-handed or X to quit: " << endl;
    cin >> leftOrRight;

    while(leftOrRight == "R" || leftOrRight == "L")
    {
        if(leftOrRight == "R")
        {
            rightTotal++;
        }
        else
        {
            leftTotal++;
        }
        cin >> leftOrRight;
    }

    cout << endl << "Number of left-handed students: " << leftTotal << endl;
    cout << "Number of right-handed students: " << rightTotal << endl;
    cout << endl << "Code by Jacob Smetana" << endl;

    return 0;
}
```

"C:\Users\Nii-san\Desktop\prog fund 1\Chapter 5\Smith Exercises & Labs\Lab 5-6.exe"

```
Enter an L if you are left-handed, an R if you are right-handed or X to quit:
R
R
R
L
L
L
R
L
R
R
L
X

Number of left-handed students: 5
Number of right-handed students: 6

Code by Jacob Smetana

Process returned 0 (0x0)   execution time : 22.830 s
Press any key to continue.
```

Exercise 5-9.

1. You plan to use the following statement in a C++ program to validate user input:
   while(inputString == “”)
   What would your user enter to cause this test to be true?
   Nothing. User just presses Enter.

2. You plan to use the following statement in a C++ program to validate user input:
   while(userAnswer == “N” || userAnswer == “n”)
   What would a user enter to cause this test to be true?
   User could enter either an uppercase or lowercase *n*.

3. You plan to use the following statement in a C++ program to validate user input:
   while(userAnswer < 1 || userAnswer > 10)
   What would a user enter to cause this test to be true?
   User could enter any number less than 1 or greater than 10 but none including or in between 1 and 10.

Lab 5-7.

5-7.cpp

```
{
    int number;          // Number to be guessed
    int userNumber;      // User's guess
    string keepGoing;    // Contains a "Y" or "N" determining if the user wants to continue

    srand((unsigned)time(NULL));
    number = (rand() % 10) + 1;      // Generate random number

    cout << "Do you want to guess a number? Enter Y or N: ";
    cin >> keepGoing;
    cout << endl;
    //Validate input
    while(keepGoing != "Y" && keepGoing != "N")
    {
        cout << "Invalid response. Please enter Y or N: ";
        cin >> keepGoing;
        cout << endl;
    }

    while(keepGoing == "Y")
    {
        cout << "I'm thinking of a number. .\n Try to guess by entering a number between 1 and 10: ";
        cin >> userNumber;
        //Validate input
        while(userNumber < 1 || userNumber > 10)
        {
            cout << "Number must be between 1 and 10. Please try again: ";
            cin >> userNumber;
            cout << endl;
        }
        if(userNumber == number)
        {
            keepGoing = "N";
            cout << "You are a genius. That's correct!" << endl;
        }
        else
        {
            cout << "That's not correct. Do you want to guess again? Enter Y or N: ";
            cin >> keepGoing;
            cout << endl;
            // Validate input
            while(keepGoing != "Y" && keepGoing != "N")
            {
                cout << "Invalid response. Please enter Y or N: ";
                cin >> keepGoing;
                cout << endl;
            }
        }
    }
    cout << endl << "Code by Jacob Smetana" << endl;
```

"C:\Users\Nii-san\Desktop\prog fund 1\Chapter 5\Smith Exercises & Labs\Lab 5-7.exe"

```
Do you want to guess a number? Enter Y or N: y

Invalid response. Please enter Y or N: n

Invalid response. Please enter Y or N: Y

I'm thinking of a number. .
 Try to guess by entering a number between 1 and 10: 22
Number must be between 1 and 10. Please try again: 7

That's not correct. Do you want to guess again? Enter Y or N: Y

I'm thinking of a number. .
 Try to guess by entering a number between 1 and 10: 5
You are a genius. That's correct!

Code by Jacob Smetana

Process returned 0 (0x0)   execution time : 12.028 s
Press any key to continue.
```