

Programming Design, Spring 2016

Suggested Solution for Homework 3

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Problem 1

- (a) The modified program is the following:

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

int main(){
    int n = 0;
    cin >> n;
    int i = 1;

    while(i <= n){
        int j = 1;           // restart j from 1 for every new row
        while(j <= n){
            cout <<" " << i*j;
            j++;
        }
        cout << "\n";       // endl after j=n
        i++;
    }
    return 0;
}
```

The use of `for` statement is better in this case, since we are only counting numbers from 1 to n . When we need to execute a loop for a fixed number of iterations, use a `for` statement with a counter declared only for the loop. This also applies if you know the maximum number of iterations and avoids potential conflicts on variable names.

- (b) By adding the `if-else` statement, our output becomes formatter and beautifier so that it is easier to read. For the integers less than 10, we place 3 spaces before them; for integers from 10 to 99, we place 2 spaces before them; the rest integers we put only 1 space. Now the columns are formatted properly.
- (c) `setw()` sets the number of characters to be used as the field width for the next insertion operation. It is a library function in C++ declared inside `#include<iomanip>`. When used in an expression `setw(n)` sets the width parameter of the stream out or in to exactly n .
- (d) The modified program is the following:

```
cout << "\n- - +- ";

//print -- in appropriate length for any value of n
for(int i = 1; i <= n ; i ++){
    cout << " - -";
}

cout << "\n";
```

Problem 2

Please see the attached CPP file.

Problem 3

Please see the attached CPP file.