

Homework # 1

01286131 Object-oriented Programming

Software Engineering Program

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By

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```

#include <iostream>
using namespace std;

void print (string star, string stars, string spaces,
            string war_sp, string mag_sp, string nin_sp, string
fig_sp,
            string warrior, string mage, string ninja, string fighter)
{
    // First row
    cout << stars << endl;
    // Second row
    cout << star << spaces << star << spaces << star << endl;
    // Third row
    cout << "* Warrior: " << war_sp << warrior << " *";
    // Fourth row
    cout << " Mage:    " << mag_sp << mage << " *" << endl;
    // Fifth row
    cout << star << spaces << star << spaces << star << endl;
    // Sixth row
    cout << stars << endl;
    // Seventh row
    cout << star << spaces << star << spaces << star << endl;
    // Eighth row
    cout << "* Ninja:   " << nin_sp << ninja << " *";
    // Ninth row
    cout << " Fighter: " << fig_sp << fighter << " *" << endl;
    // Tenth row
    cout << star << spaces << star << spaces << star << endl;
    // 11th row
    cout << stars << endl;
}

int main()
{
    string warrior, mage, ninja, fighter;

    cout << "Enter Warrior name: ";
    cin >> warrior;
    cout << "Enter Mage name: ";
    cin >> mage;
    cout << "Enter Ninja name: ";
    cin >> ninja;
    cout << "Enter Fighter name: ";
    cin >> fighter;

    int warr_len = warrior.length();
    int mag_len = mage.length();

```

```

int ninja_len = ninja.length();
int fighter_len = fighter.length();
int highest_len = warr_len;

if (highest_len < mag_len)
{
    highest_len = mag_len;
}
else if (highest_len < ninja_len)
{
    highest_len = ninja_len;
}
else if (highest_len < fighter_len)
{
    highest_len = fighter_len;
}
else{
    highest_len = warr_len;
}

int stars_len = ((12 + highest_len) * 2 ) + 1;
string stars(stars_len, '*');
string spaces( ((stars_len / 2)-1) , ' ');

int war = highest_len - warr_len;
int mag = highest_len - mag_len;
int nin = highest_len - ninja_len;
int fig = highest_len - fighter_len;
string star = "*";

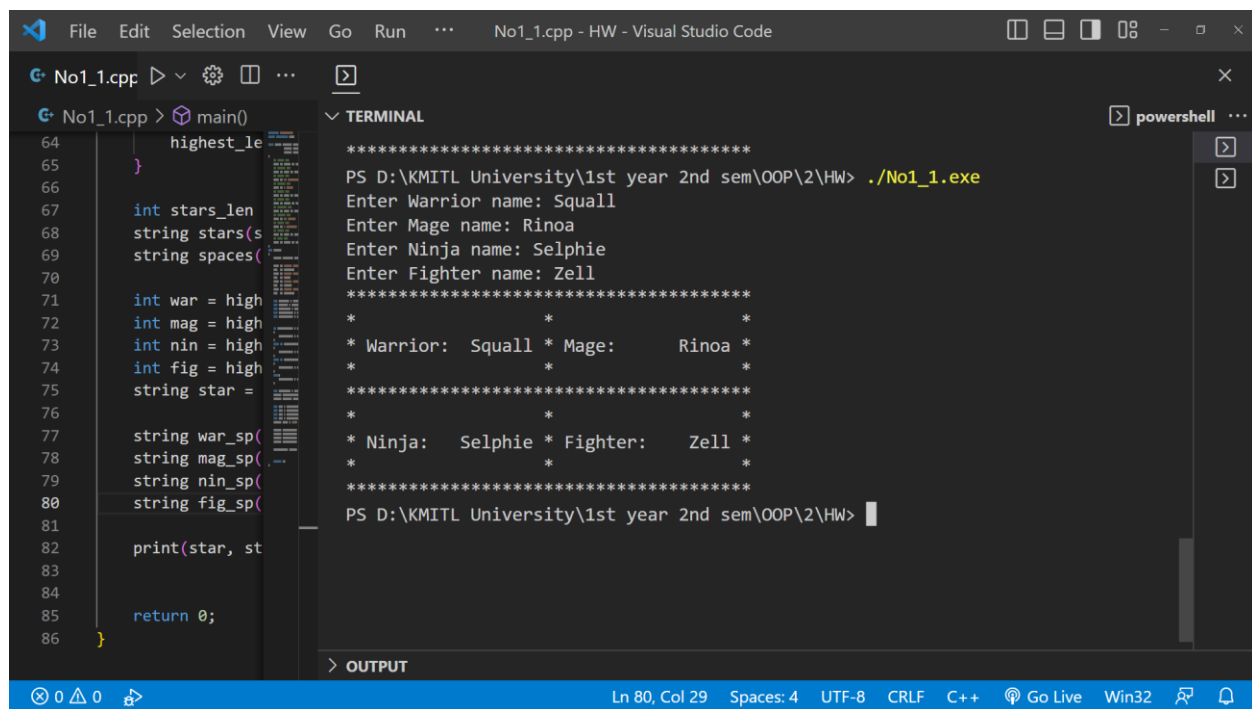
string war_sp(war, ' ');
string mag_sp(mag, ' ');
string nin_sp(nin, ' ');
string fig_sp(fig, ' ');

print(star, stars, spaces, war_sp, mag_sp, nin_sp, fig_sp,
warrior, mage, ninja, fighter);

return 0;
}

```

Result



```
File Edit Selection View Go Run ... No1_1.cpp - HW - Visual Studio Code

No1_1.cpp > main()
64     highest_le
65 }
66
67 int stars_len
68 string stars(s
69 string spaces(
70
71 int war = high
72 int mag = high
73 int nin = high
74 int fig = high
75 string star =
76
77 string war_sp(
78 string mag_sp(
79 string nin_sp(
80 string fig_sp(
81
82 print(star, st
83
84
85 return 0;
86 }
```

```
*****
PS D:\KMITL University\1st year 2nd sem\OOP\2\HW> ./No1_1.exe
Enter Warrior name: Squall
Enter Mage name: Rinoa
Enter Ninja name: Selphie
Enter Fighter name: Zell
*****
*           *
* Warrior:  Squall * Mage:    Rinoa *
*           *
*****
*           *
* Ninja:   Selphie * Fighter:  Zell *
*           *
*****
PS D:\KMITL University\1st year 2nd sem\OOP\2\HW>
```

0 0 0 Ln 80, Col 29 Spaces: 4 UTF-8 CRLF C++ Go Live Win32

No1.2

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

void print (string plus, string single, string equals, string spaces,
            string minus,
            string war_sp, string mag_sp, string nin_sp, string
fig_sp,
            string warrior, string mage, string ninja, string fighter)
```

```

{
    // First row
    cout << plus << equals << plus << equals << plus << endl;
    // Second row
    cout << single << spaces << single << spaces << single << endl;
    // Third row
    cout << "| warrior: " << war_sp << warrior << " |";
    // Fourth row
    cout << " Mage:      " << mag_sp << mage << " |" << endl;
    // Fifth row
    cout << single << spaces << single << spaces << single << endl;
    // Sixth row
    cout << plus << minus << plus << minus << plus << endl;
    // Seventh row
    cout << single << spaces << single << spaces << single << endl;
    // Eighth row
    cout << "| Ninja:    " << nin_sp << ninja << " |";
    // Ninth row
    cout << " Fighter: " << fig_sp << fighter << " |" << endl;
    // Tenth row
    cout << single << spaces << single << spaces << single << endl;
    // 11th row
    cout << plus << equals << plus << equals << plus << endl;
}

```

```

int main() {
    string warrior, mage, ninja, fighter;

    cout << "Enter Warrior name: ";
    cin >> warrior;
    cout << "Enter Mage name: ";
    cin >> mage;
    cout << "Enter Ninja name: ";
    cin >> ninja;
    cout << "Enter Fighter name: ";
    cin >> fighter;

    int warr_len = warrior.length();
    int mag_len = mage.length();
    int ninja_len = ninja.length();
    int fighter_len = fighter.length();
    int highest_len = warr_len;

    if (highest_len < mag_len)
    {

```

```

        highest_len = mag_len;
    }
    else if (highest_len < ninja_len)
    {
        highest_len = ninja_len;
    }
    else if (highest_len < fighter_len)
    {
        highest_len = fighter_len;
    }
    else{
        highest_len = warr_len;
    }

    int base_len = ((12 + highest_len) * 2 ) + 1;

    string equals(((base_len / 2)-1), '=');
    string minus(((base_len / 2)-1), '-');
    string spaces( ((base_len / 2)-1) , ' ');
    string plus    = "+";
    string single = "|";

    int war = highest_len - warr_len;
    int mag = highest_len - mag_len;
    int nin = highest_len - ninja_len;
    int fig = highest_len - fighter_len;

    string war_sp(war, ' ');
    string mag_sp(mag, ' ');
    string nin_sp(nin, ' ');
    string fig_sp(fig, ' ');

    print(plus, single, equals, spaces, minus, war_sp, mag_sp, nin_sp,
fig_sp, warrior, mage, ninja, fighter);

    return 0;
}

```

Result

The screenshot shows the Visual Studio Code editor with a C++ file named `No1_2.cpp`. The code defines variables for warrior, mage, ninja, and fighter names and their lengths, then prints them in a formatted table. The terminal window shows the execution of `./No1_2.exe` with the following input and output:

```
PS D:\KMITL University\1st year 2nd sem\OOP\2\HW\No1> ./No1_2.exe
Enter Warrior name: Squall
Enter Mage name: Rinoa
Enter Ninja name: Selphie
Enter Fighter name: Zell
+=====+
| warrior:  Squall | Mage:      Rinoa |
+-----+
| Ninja:   Selphie | Fighter:   Zell |
+=====+
PS D:\KMITL University\1st year 2nd sem\OOP\2\HW\No1>
```

The status bar at the bottom indicates the current position is Line 26, Column 17, with 4 spaces, UTF-8 encoding, CRLF line endings, and C++ language.

No2

No2.1

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

int main(){
    double temp = 0;
    cout<< "Fahr    Celsius" << endl;
    for (double f= 0.0; f <= 300.0 ; f+=20 )
    {
        temp = (5.0/9.0) * (f-32.0);
        if (temp > 100)
        {
            cout<< setw(3) << f << setw(12) << setprecision(4) << temp << endl;
        }
        else
        {
            cout<< setw(3) << f << setw(12) << setprecision(3) << temp << endl;
        }
    }
    return 0;
}
```

File Edit Selection View Go Run ... No2_1.cpp - HW - Visual Studio Code

No2_1.cpp x

No2 > No2_1.cpp > main()

```
1 #include <iostream>
2 #include <iomanip>
3 using namespace std;
4
5 int main()
6 {
7     cout<< "Fahr    Celsius\n";
8     for (double f= 0.0; f<= 300; f+= 20)
9     {
10         temp = (5.0/9.0) * f;
11         if (temp > 100)
12         {
13             cout<< setw(3) << " " << "\n";
14         }
15         else
16         {
17             cout<< setw(3) << " " << "\n";
18         }
19     }
20     return 0;
21 }
22
```

OUTPUT

```
[Running] cd "d:\KMITL University\1st year 2nd sem\OOP\2\HW\No2\" && g++ No2_1.cpp -o No2_1 && "d:\KMITL University\1st year 2nd sem\OOP\2\HW\No2\"No2_1
Fahr    Celsius
0       -17.8
20      -6.67
40       4.44
60      15.6
80      26.7
100     37.8
120     48.9
140     60
160     71.1
180     82.2
200     93.3
220    104.4
240    115.6
260    126.7
280    137.8
300    148.9

[Done] exited with code=0 in 0.573 seconds
```

TERMINAL

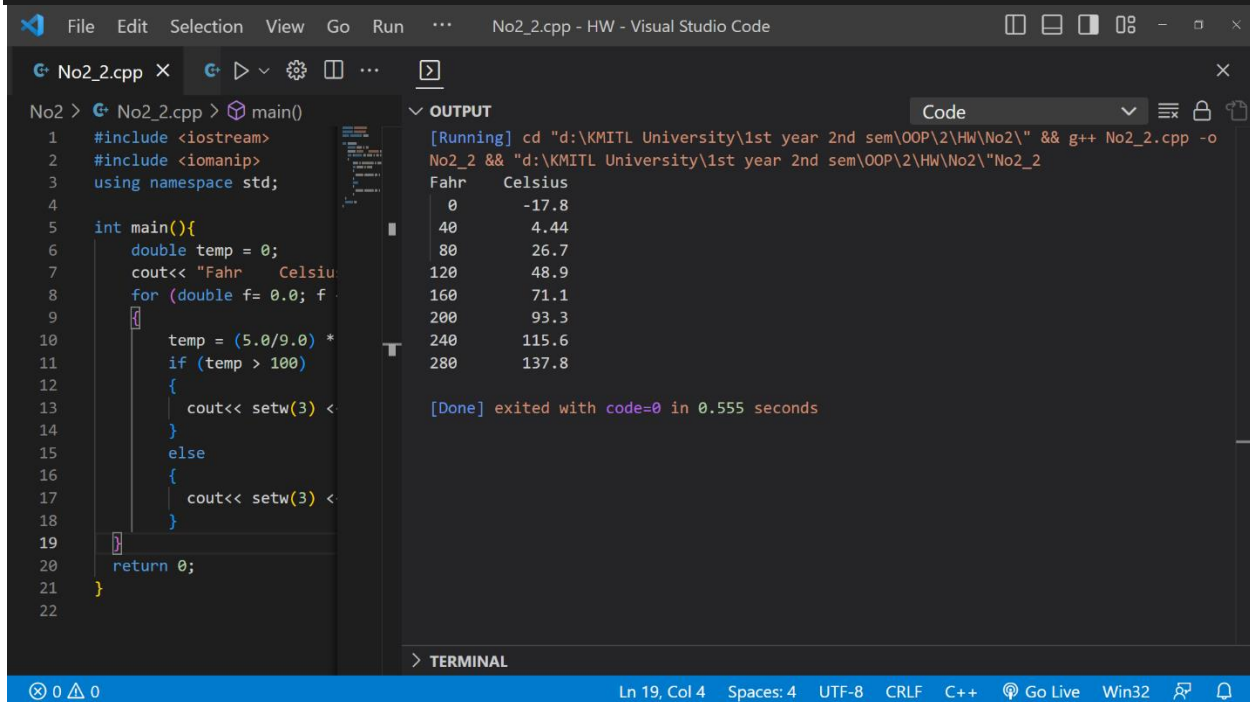
0 0 0

Ln 7, Col 38 Spaces: 4 UTF-8 CRLF C++ Go Live Win32

No2.2

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

int main(){
    double temp = 0;
    cout<< "Fahr    Celsius" << endl;
    for (double f= 0.0; f <= 300.0 ; f+= 40 )
    {
        temp = (5.0/9.0) * (f-32.0);
        if (temp > 100)
        {
            cout<< setw(3) << f << setw(12) << setprecision(4) << temp << endl;
        }
        else
        {
            cout<< setw(3) << f << setw(12) << setprecision(3) << temp << endl;
        }
    }
    return 0;
}
```



The screenshot shows the Visual Studio Code interface with the file `No2_2.cpp` open. The code is a C++ program that converts Fahrenheit temperatures to Celsius. The output window shows the results of the program's execution.

Code:

```
No2 > No2_2.cpp > main()
1 #include <iostream>
2 #include <iomanip>
3 using namespace std;
4
5 int main(){
6     double temp = 0;
7     cout<< "Fahr    Celsius" << endl;
8     for (double f= 0.0; f <= 300.0 ; f+= 40 )
9     {
10         temp = (5.0/9.0) * (f-32.0);
11         if (temp > 100)
12         {
13             cout<< setw(3) << f << setw(12) << setprecision(4) << temp << endl;
14         }
15         else
16         {
17             cout<< setw(3) << f << setw(12) << setprecision(3) << temp << endl;
18         }
19     }
20     return 0;
21 }
22
```

OUTPUT:

```
[Running] cd "d:\KMITL University\1st year 2nd sem\OOP\2\HW\No2\" && g++ No2_2.cpp -o No2_2 && "d:\KMITL University\1st year 2nd sem\OOP\2\HW\No2\No2_2"
Fahr    Celsius
 0      -17.8
40       4.44
80      26.7
120     48.9
160     71.1
200     93.3
240    115.6
280    137.8

[Done] exited with code=0 in 0.555 seconds
```

TERMINAL:

```
>
```

Ln 19, Col 4 Spaces: 4 UTF-8 CRLF C++ Go Live Win32

No2.3

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

int main(){
    double temp = 0;
    cout<< "Fahr    Celsius" << endl;
    for (double f= 300.0; f >= 0.0 ; f-= 20 )
    {
        temp = (5.0/9.0) * (f-32.0);
        if (temp > 100)
        {
            cout<< setw(3) << f << setw(12) << setprecision(4) << temp << endl;
        }
        else
        {
            cout<< setw(3) << f << setw(12) << setprecision(3) << temp << endl;
        }
    }
    return 0;
}
```

Visual Studio Code interface showing the execution of a C++ program. The code is in `No2_3.cpp` and the output is displayed in the **OUTPUT** window.

Code:

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

int main(){
    double temp = 0;
    cout<< "Fahr    Celsius" << endl;
    for (double f= 300.0; f >= 0.0 ; f-= 20 )
    {
        temp = (5.0/9.0) * (f-32.0);
        if (temp > 100)
        {
            cout<< setw(3) << f << setw(12) << setprecision(4) << temp << endl;
        }
        else
        {
            cout<< setw(3) << f << setw(12) << setprecision(3) << temp << endl;
        }
    }
    return 0;
}
```

OUTPUT:

```
[Running] cd "d:\KMITL University\1st year 2nd sem\OOP\2\HW\No2\" && g++ No2_3.cpp -o
No2_3 && "d:\KMITL University\1st year 2nd sem\OOP\2\HW\No2\"No2_3
Fahr    Celsius
300      148.9
280      137.8
260      126.7
240      115.6
220      104.4
200       93.3
180       82.2
160       71.1
140       60
120       48.9
100       37.8
80        26.7
60        15.6
40         4.44
20        -6.67
0         -17.8

[Done] exited with code=0 in 0.671 seconds
```

TERMINAL:

```
> TERMINAL
```

Ln 11, Col 23 Spaces: 4 UTF-8 CRLF C++ Go Live Win32

No3

```
//// random.hpp
#ifndef MY_RANDOM_HPP
#define MY_RANDOM_HPP

#include <random>

class Rand_double {
public:
    using seed_type = std::random_device::result_type;

    Rand_double(double low, double high): dist{low,high} {}

    // draw an integer number
    double operator()() { return dist(re); }

    // choose new random engine seed
    void seed(seed_type s) { re.seed(s); }
private:
    std::default_random_engine re;
    std::uniform_real_distribution<double> dist;
};

#include <iomanip>
#include <iostream>
#include <vector>
#include <math.h>

template<typename T_>
inline constexpr
    T_ pi_v{3.141592653589793238462643383279502884L};

inline constexpr double pi = pi_v<double>;

int main()
{
    constexpr double rnd_min = 0.0, rnd_max = 1.0;
    Rand_double rnd{rnd_min, rnd_max};

    std::random_device rd;
    rnd.seed(rd());
    std::cout << std::fixed << std::setprecision(3);

    std::cout << "Please enter N: ";
    int N;
    std::cin >> N;

    int count = 0;
    double total_squared_errors = 0.0;

    while (count != N){
        double random_num = rnd();
```

```

        total_squared_errors += (0.5-random_num)*(0.5-random_num);

        count++;
    }

    double mean_squared_error = total_squared_errors / N;
    std::cout << "MSE is : " << mean_squared_error;
    return 0;
}
// end::lab1-3b[]

#endif /* MY_RANDOM_HPP */

```

The screenshot shows the Visual Studio Code editor with the file `No3.cpp` open. The code defines a `Rand_double` class that uses a random device to generate random numbers. The terminal window shows the execution of the program, which prompts the user to enter a value for `N` and then calculates the Mean Squared Error (MSE).

Terminal Output:

```

PS D:\KMITL University\1st year 2nd sem\OOP\2\HW> ./No3.exe
Please enter N: 100000
MSE is : 0.084
PS D:\KMITL University\1st year 2nd sem\OOP\2\HW> ./No3.exe
Please enter N: 10
MSE is : 0.137
PS D:\KMITL University\1st year 2nd sem\OOP\2\HW> ./No3.exe
Please enter N: 3
MSE is : 0.046
PS D:\KMITL University\1st year 2nd sem\OOP\2\HW> ./No3.exe
Please enter N: 50000000
MSE is : 0.083
PS D:\KMITL University\1st year 2nd sem\OOP\2\HW> 

```

OUTPUT:

```

[Running] cd "d:\KMITL University\1st year 2nd sem\OOP\2\HW\" && g++
No3.cpp -o No3 && "d:\KMITL University\1st year 2nd sem\OOP\2\HW\"No3
Please enter N:
[Done] exited with code=1 in 3.514 seconds

```