MonsterWorldGame.cpp | VariousMonsters.h | MonsterWorld.h | RankingBo

Week11_Homework3 | (Global Scope)

```cpp
#include "MonsterWorld.h"
#include "VariousMonsters.h"
#include "RankingBoard.h"
#include <time.h>

int main()
{
    RankingBorad rank;
    try { rank.load("MonsterWorld.rnk"); }
    catch (FileException e) {
        char str[80];
        string passwd, correct = "123456";
        cout << "관리자 비밀번호를 입력하세요 : ";
        for (int i = 0;; i++) {
            str[i] = _getch();
            putchar('*');
            if (str[i] == '\r') {
                str[i] = '\0';
                passwd = str;
                cout << "\n";
                break;
            }
        }
        if (passwd != correct) {
            cout << "비밀번호가 맞지 않습니다. 게임종료. \n\n";
            exit(0);
        }
    }
    rank.print("[게임 랭킹 : 시작]");

    srand((unsigned int)time(NULL));
    int w = 16, h = 8;

    MonsterWorld game(w, h);
    game.add(new Zombie("허접좀비", "§", rand() % w, rand() % h));
```

79 % | No issues found | Ln: 50 | Ch: 2 | TABS | CRLF

C:₩Users₩user₩source₩repos₩Week11_Homework3₩x64₩Debug₩Week11_Homework3.exe

```
관리자 비밀번호를 입력하세요 :
```

MonsterWorldGame.cpp | VariousMonsters.h | MonsterWorld.h | RankingBo

Week11_Homework3 | (Global Scope)

```cpp
    MonsterWorld game(w, h);
    game.add(new Zombie("허접좀비", "§", rand() % w, rand() % h));
    game.add(new Vampire("뱀파이어짱", "★", rand() % w, rand() % h));
    game.add(new KGhost("어쩌다귀신", "♥", rand() % w, rand() % h));
    game.add(new Jiangshi("못먹어도고", "¤", rand() % w, rand() % h, true));
    game.add(new Jiangshi("못먹어세로", "‡", rand() % w, rand() % h, false));

    Human* human = new Human("미래의인류", "♀", rand() % w, rand() % h);
    game.add(human);
    game.play(500, 10);
    printf("------게임 종료----------\n");

    rank.add(human->nItem, human->nItem / human->total);
    rank.print("[게임 랭킹 : 종료]");
    rank.store("MonsterWorld.rnk");
    return 0;
}
```

79 % | No issues found | Ln: 8 | Ch: 20 | Col: 23 | TABS | CRLF

Microsoft Visual Studio Debug Console

```
관리자 비밀번호를 입력하세요 : *****
비밀번호가 맞지 않습니다. 게임종료.


C:₩Users₩user₩source₩repos₩Week11_Homework3₩x64₩Debug₩Week11_Homework3.exe (process 15200) e
Press any key to close this window . . .
```

MonsterWorldGame.cpp | VariousMonsters.h | MonsterWorld.h | RankingBoard.h | Monster.h | Matrix.h | Point.h | FileException.h | Canvas.h

Week11_Homework3 | Jiangshi

```cpp
#pragma once
#include "Monster.h"
#include <conio.h>
enum Direction { Left = 75, Right = 77, Up = 72, Down = 80 };

class Zombie : public Monster {
public:
    Zombie(string n = "허접좀비", string i = "§", int x = 0, int y = 0)
        : Monster(n, i, x, y) {}
    ~Zombie() { cout << " Zombie"; }
};

class Vampire : public Monster {
public:
    Vampire(string n = "뱀파이어", string i = "★", int x = 0, int y = 0)
        : Monster(n, i, x, y) {}
    ~Vampire() { cout << " Vampire"; }

    void move(int** map, int maxx, int maxy) {
        if (!isSleep()) {
            int dir = rand() % 4;
            if (dir == 0) p[0]--;
            else if (dir == 1) p[0]++;
            else if (dir == 2) p[1]--;
            else p[1]++;
            clip(maxx, maxy);
            eat(map);
        }
    }
};

class KGhost : public Monster {
public:
    KGhost(string n = "처녀귀신", string i = "♥", int x = 0, int y = 0)
        : Monster(n, i, x, y) {}
```

79 % | No issues found

C:₩Users₩user₩source₩repos₩Week11_Homework3₩x64₩Debug₩Week11_Homework3.exe

```
관리자 비밀번호를 입력하세요 :
```

MonsterWorldGame.cpp | VariousMonsters.h | MonsterWorld.h | RankingBoard.h | Monster.h | Matrix.h | Point.h | FileException.h | Canvas.h

Week11_Homework3 — Vampire

```
    KGhost(string n = "처녀귀신", string i = "♥", int x = 0, int y = 0)
        : Monster(n, i, x, y) {}
    ~KGhost() { cout << " KGhost"; }

    void move(int** map, int maxx, int maxy) {
        if (!isSleep()) {
            p = Point(rand() % maxx, rand() % maxy);
            clip(maxx, maxy);
            eat(map);
        }
    }
};

class Jiangshi : public Monster {
    bool bHori;
public:
    Jiangshi(string n = "대륙강시", string i = "☻", int x = 0, int y = 0, bool bH = true)
        : Monster(n, i, x, y), bHori(bH) {}
    ~Jiangshi() { cout << " Jangshi"; }

    void move(int** map, int maxx, int maxy) {
        if (!isSleep()) {
            int dir = rand() % 2;
            int jump = rand() % 2 + 1;
            if (bHori) p[0] += ((dir == 0) ? -jump : jump);
            else p[1] += ((dir == 0) ? -jump : jump);
            clip(maxx, maxy);
            eat(map);
        }
    }
};

class Human : public Monster {
public:
    Human(string n = "미래인류", string i = "♀", int px = 0, int py = 0)
```

79 % — No issues found

C:₩Users₩user₩source₩repos₩Week11_Homework3₩x64₩Debug₩Week11_Homework3.exe

```
관리자 비밀번호를 입력하세요 : *******

[게임 랭킹 : 시작]
[1위]신인류      0 0
[2위]신인류      0 0
[3위]신인류      0 0
[4위]신인류      0 0
[5위]신인류      0 0
엔터를 입력하세요.
```

MonsterWorldGame.cpp | VariousMonsters.h | MonsterWorld.h | RankingBoard.h | Monster.h | Matrix.h | Point.h | FileException.h | Canvas.h

Week11_Homework3 — (Global Scope)

```
public:
    Human(string n = "미래인류", string i = "♀", int px = 0, int py = 0)
        : Monster(n, i, px, py) {}
    ~Human() { cout << "[Human ]"; }

    int getDirKey() { return _getche() == 224 ? _getche() : 0; }

    void move(int** map, int maxx, int maxy) {
        if (_kbhit())
        {
            char ch = getDirKey();
            if (ch == Left) p[0]--;
            else if (ch == Right) p[0]++;
            else if (ch == Up) p[1]--;
            else if (ch == Down) p[1]++;
            else return;
            clip(maxx, maxy);
            eat(map);
        }
    }
};
```

79 % — No issues found

C:₩Users₩user₩source₩repos₩Week11_Homework3₩x64₩Debug₩Week11_Homework3.exe

```
[ Monster World (relaxed World) ]
■■★■■■■♥■■■■■■■■
■■■■■■■■■■■■■■■■
■■■■■■■■§■■■■■■■■
■■■■↔■↕■■■■■■■■■
♀■■■■■■■■■■■■■■■■
■■■■■■■■■■■■■■■■
■■■■■■■■■■■■■■■■
■■■■■■■■■■■■■■■■

전체 이동 횟수 = 0
남은 아이템 수 = 128
        허접한좀비§:0:0
        뱀파이어짱★:0:0
        어쩌다귀신♥:0:0
        못먹어도고↔:0:0
        못먹어세로↕:0:0
        미래의인류♀:0:0
엔터를 누르세요...
```

MonsterWorldGame.cpp | VariousMonsters.h | MonsterWorld.h | RankingBoard.h | Monster.h | Matrix.h | Point.h | FileException.h | Canvas.h

Week11_Homework3 — (Global Scope)

```
#pragma once
#include "Canvas.h"
#include "Monster.h"
#include "Matrix.h"
#include <Windows.h>
#define MAXMONS 8

class MonsterWorld
{
    Matrix world;
    int xMax, yMax, nMon, nMove;
    Monster* pMon[MAXMONS];
    Canvas canvas;

    int& Map(int x, int y) { return world.elem(x, y); }
    bool isDone() { return countItems() == 0; }
    int countItems() {
        int nItems = 0;
        for (int y = 0; y < yMax; y++)
            for (int x = 0; x < xMax; x++)
                if (Map(x, y) > 0) nItems++;
        return nItems;
    }
    void print() {
        canvas.clear(". ");
        for (int y = 0; y < yMax; y++)
            for (int x = 0; x < xMax; x++)
                if (Map(x, y) > 0) canvas.draw(x, y, "■");
        for (int i = 0; i < nMon; i++)
            pMon[i]->draw(canvas);
        canvas.print("[ Monster World (relaxed World) ]");

        cerr << " 전체 이동 횟수 = " << nMove << endl;
        cerr << " 남은 아이템 수 = " << countItems() << endl;
        for (int i = 0; i < nMon; i++) pMon[i]->print();
```

79 % — 0 — 1

C:₩Users₩user₩source₩repos₩Week11_Homework3₩x64₩Debug₩Week11_Homework3.exe

```
[ Monster World (relaxed World) ]
. ■. . . . . ■■■. . . . . §
■■. . . . . ■■■■■■■. ■■
■■. ■■. . ■■■■■■■■■. ■
■♥↔. . ★. . . ■■■■. ■■
♀■■■■■■↕■■■■■■■■■■■
■■■■■■■. ■■■■■■■■■■■
. ■■■■■■. ■■■■■■■■■■■
■■■■■■■. ■■■■■■■■■■■

전체 이동 횟수 = 19
남은 아이템 수 = 92
        허접한좀비§:6:0
        뱀파이어짱★:10:0
        어쩌다귀신♥:5:0
        못먹어도고↔:7:6
        못먹어세로↕:8:9
        미래의인류♀:0:0
```

MonsterWorldGame.cpp | VariousMonsters.h | **MonsterWorld.h** | RankingBoard.h | Monster.h | Matrix.h | Point.h | FileException.h | Canvas.h

Week11_Homework3 — MonsterWorld

```
34          cerr << " 남은 아이템 수 = " << countItems() << endl;
35          for (int i = 0; i < nMon; i++) pMon[i]->print();
36      }
37  public:
38      MonsterWorld(int w, int h) : world(h, w), canvas(w, h), xMax(w), yMax(h) {
39          nMon = 0;
40          nMove = 0;
41          for (int y = 0; y < yMax; y++)
42              for (int x = 0; x < xMax; x++) Map(x, y) = 1;
43      }
44      ~MonsterWorld() {
45          for (int i = 0; i < nMon; i++)
46              delete pMon[i];
47      }
48      void add(Monster* m) { if (nMon < MAXMONS) pMon[nMon++] = m; }
49      void play(int maxwalk, int wait) {
50          print();
51          cerr << " 엔터를 누르세요...";
52          getchar();
53          for (int i = 0; i < maxwalk; i++)
54          {
55              for (int k = 0; k < nMon; k++)
56                  pMon[k]->move(world.Data(), xMax, yMax);
57              nMove++;
58              print();
59              if (isDone()) break;
60              Sleep(wait);
61          }
62      }
63  };
```

79 % | 0 | 1

C:₩Users₩user₩source₩repos₩Week11_Homework3₩x64₩Debug₩Week11_Homework3.exe

```
[ Monster World (relaxed World) ]
. ■. . . . . . . . . . . . . §
■. . . . . . . . . . . . ■■. ■■
■. . . ★. ↕. . . . ■. ■. ■
■. . . . . . . . . . . . . ↔
. ■. ■■■. . . . . . . . ■.
. ■♥■. ■. . . . . ■■. ■■
. ■■■. ■. ■■■. ■■■■■
. . . . . . . . . . . . . ♀

전체 이동 횟수 = 192
남은 아이템 수 = 35
        허접한좀비§:6:0
        뱀파이어짱★:29:4
        어쩌다귀신♥:22:1
        못먹어도고↔:12:0
        못먹어세로↕:8:0
        미래의인류♀:16:0
```

MonsterWorldGame.cpp | VariousMonsters.h | MonsterWorld.h | **RankingBoard.h** | Monster.h | Matrix.h | Point.h | FileException.h | Canvas.h

Week11_Homework3 — RankingBorad

```
1   #pragma once
2   #include <iostream>
3   #include <fstream>
4   #include "FileException.h"
5   using namespace std;
6   #define NUM_MVP 5
7
8   struct PlayInfo
9   {
10      string name;
11      int nItem;
12      double itemPerMove;
13      PlayInfo(string na = "신인류", int ni = 0, double ipm = 0.0)
14          :name(na), nItem(ni), itemPerMove(ipm) {}
15  };
16
17  class RankingBorad
18  {
19      PlayInfo MVP[NUM_MVP];
20      int nMVP = NUM_MVP;
21  public:
22      void load(string filename) {
23          ifstream is;
24          is.open(filename);
25          if (!is) throw(FileException(filename, true));
26          for (int i = 0; i < nMVP; i++)
27              is >> MVP[i].nItem >> MVP[i].name >> MVP[i].itemPerMove;
28          is.close();
29      }
30      void store(string filename) {
31          ofstream os;
32          os.open(filename);
33          if (!os) throw(FileException(filename, false));
34          for (int i = 0; i < nMVP; i++)
35              os << MVP[i].nItem << " " << MVP[i].name << " " << MVP[i].itemPerMove << "\n";
```

79 % | 0 | 1

C:₩Users₩user₩source₩repos₩Week11_Homework3₩x64₩Debug₩Week11_Homework3.exe

```
[ Monster World (relaxed World) ]
. ■. . . . . . . . . . . . . §
■. . . . . . . . . . . . ■■♥■■
. . . . . . . . . . . . . ■. .
. ↔. . . . . . . . . . . . .
. . . ■■■. . . . . . . . ■.
. ■. ■. . . . . . . ■■. ■.
. ■■★. . ↕■■■. ■■■■■
. . . . . . . . . . . . . ♀

전체 이동 횟수 = 276
남은 아이템 수 = 26
        허접한좀비§:6:0
        뱀파이어짱★:32:0
        어쩌다귀신♥:27:0
        못먹어도고↔:13:0
        못먹어세로↕:8:6
        미래의인류♀:16:0
```

MonsterWorldGame.cpp | VariousMonsters.h | MonsterWorld.h | **RankingBoard.h** | Monster.h | Matrix.h | Point.h | FileException.h | Canvas.h

Week11_Homework3 — PlayInfo

```
34          for (int i = 0; i < nMVP; i++)
35              os << MVP[i].nItem << " " << MVP[i].name << " " << MVP[i].itemPerMove << "\n";
36          os.close();
37      }
38      void print(string title = "게임랭킹") {
39          cout << endl << title << endl;
40          for (int i = 0; i < nMVP; i++)
41          cout << "[" << i + 1 << "위]"
42              << MVP[i].name << "\t" << MVP[i].nItem << " " << MVP[i].itemPerMove << "\n";
43          cout << "엔터를 입력하세요.";
44          getchar();
45          cout << endl;
46      }
47      int add(int nItem, double ipm) {
48          if (nItem <= MVP[nMVP - 1].nItem) return 0;
49
50          int pos = nMVP - 1;
51          for (; pos > 0; pos--) {
52              if (nItem <= MVP[pos - 1].nItem) break;
53              MVP[pos] = MVP[pos - 1];
54          }
55          MVP[pos].nItem = nItem;
56          MVP[pos].itemPerMove = ipm;
57          cout << "\n[" << pos + 1 << "위] 이름을 입력하세요 : ";
58          cin >> MVP[pos].name;
59          return pos + 1;
60      }
61  };
62
```

79 % | 0 | 1

C:₩Users₩user₩source₩repos₩Week11_Homework3₩x64₩Debug₩Week11_Homework3.exe

```
[ Monster World (relaxed World) ]
. . . . . . . ★. . . . . . .
. . . . . . . . . . ■■. . §♀
. . . . . ↕. . . . . . ■. .
. . . . ↔. . . . . . . . . .
. . . . . . . . . . . . . .
. ■. . . . . . . . . ■. . ■.
. . ■. . . . ■. . . . ■. ■.
. . . . . . . . . ♥. . . . .

전체 이동 횟수 = 391
남은 아이템 수 = 10
        허접한좀비§:6:0
        뱀파이어짱★:38:1
        어쩌다귀신♥:35:8
        못먹어도고↔:13:5
        못먹어세로↕:8:0
        미래의인류♀:18:10
```

MonsterWorldGame.cpp | VariousMonsters.h | MonsterWorld.h | RankingBoard.h | Monster.h | Matrix.h | Point.h | FileException.h | Canvas.h

Week11_Homework3 > Monster

```cpp
#pragma once
#include "Canvas.h"
#include "Point.h"

class Monster
{
public:
    string name, icon;
    int nItem;
    Point q, p;
    int nSleep;
    double dist;
    double total;

    void clip(int maxx, int maxy) { p(maxx, maxy); }
    void eat(int** map) {
        if (map[p.y][p.x] == 1)
        {
            map[p.y][p.x] = 0;
            nItem++;
        }
        dist += (double)(p - q);
        total += (double)(p - q);
        q = p;
        if (dist > 20)
        {
            dist = 0;
            nSleep = 10;
        }
    }
    bool isSleep() {
        if (nSleep > 0)
        {
            nSleep--;
            return true;
```

79 % | No issues found

C:₩Users₩user₩source₩repos₩Week11_Homework3₩x64₩Debug₩Week11_Homework3.exe

```
[ Monster World (relaxed World) ]
. . . . . . . . . . . . . . . . . . . . §
. . . . . . . . . . . . . ■ . . . . . ♀
. . . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . ↔ . . . . . ♥
. . . . . . . . . . . . . . . . . . . . .
. ■ . . . . . . . . . . . . . . . ■ . . .
. . . . . ↕ . . . . . . . . . . . . ■ .
. . . . . ★ . . . . . . . . . . . . . .

전체 이동 횟수 = 500
남은 아이템 수 = 5
        허접한좀비§:6:0
        뱀파이어짱★:40:0
        어쩌다귀신♥:38:7
        못먹어도고↔:13:0
        못먹어세로↕:8:4
        미래의인류♀:18:10
------게임 종료------------

[1위] 이름을 입력하세요 :
```

MonsterWorldGame.cpp | VariousMonsters.h | MonsterWorld.h | RankingBoard.h | Monster.h | Matrix.h | Point.h | FileException.h | Canvas.h

Week11_Homework3 > Monster

```cpp
            nSleep--;
            return true;
        }
        else return false;
    }
public:
    Monster(string n = "무명괴물", string i = "※", int x = 0, int y = 0)
        : name(n), icon(i), nItem(0),
        p(x, y), q(x, y), nSleep(0), dist(0.0), total(0.0) { }
    virtual ~Monster() { cout << icon << nItem << "거리:" << total << endl; }

    void draw(Canvas& canvas) { canvas.draw(p, icon); }
    virtual void move(int** map, int maxx, int maxy) {
        if (!isSleep())
        {
            int num = rand() % 9 + 1;
            p = p + Point(num % 3 - 1, num / 3 - 1);
            clip(maxx, maxy);
            eat(map);
        }
    }
    void print() { cout << "\t" << name << icon << ":" << nItem << ":" << nSleep << endl; }
};
```

79 % | No issues found

C:₩Users₩user₩source₩repos₩Week11_Homework3₩x64₩Debug₩Week11_Homework3.exe

```
[ Monster World (relaxed World) ]
. . . . . . . . . . . . . . . . . . . . §
. . . . . . . . . . . . . ■ . . . . . ♀
. . . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . ↔ . . . . . ♥
. . . . . . . . . . . . . . . . . . . . .
. ■ . . . . . . . . . . . . . . . ■ . . .
. . . . . ↕ . . . . . . . . . . . . ■ .
. . . . . ★ . . . . . . . . . . . . . .

전체 이동 횟수 = 500
남은 아이템 수 = 5
        허접한좀비§:6:0
        뱀파이어짱★:40:0
        어쩌다귀신♥:38:7
        못먹어도고↔:13:0
        못먹어세로↕:8:4
        미래의인류♀:18:10
------게임 종료------------

[1위] 이름을 입력하세요 :
```

MonsterWorldGame.cpp | VariousMonsters.h | MonsterWorld.h | RankingBoard.h | Monster.h | Matrix.h | Point.h | FileException.h | Canvas.h

Week11_Homework3 > Matrix

```cpp
#pragma once
#include <iostream>
#include <iomanip>
using namespace std;

class Matrix
{
    int rows, cols;
    int** mat;
public:
    Matrix(int r = 0, int c = 0) : rows(r), cols(c), mat(NULL) {
        mat = new int* [rows];
        for (int i = 0; i < rows; i++) mat[i] = new int[cols];
    }
    ~Matrix() {
        if (mat != NULL)
        {
            for (int i = 0; i < rows; i++)
                delete[] mat[i];
            delete[] mat;
        }
    }
    int& elem(int x, int y) { return mat[y][x]; }
    int Rows() { return rows; }
    int Cols() { return cols; }
    int** Data() { return mat; };
    void print(const char* str = "Mat") {
        cout << str << " " << rows << "x" << cols << endl;
        for (int i = 0; i < rows; i++)
        {
            for (int j = 0; j < cols; j++)
                cout << setw(4) << mat[i][j];
            cout << "\n";
        }
    }
```

79 % | No issues found

C:₩Users₩user₩source₩repos₩Week11_Homework3₩x64₩Debug₩Week11_Homework3.exe

```
[ Monster World (relaxed World) ]
. . . . . . . . . . . . . . . . . . . . §
. . . . . . . . . . . . . ■ . . . . . ♀
. . . . . . . . . . . . . . . . . . . . .
. . . . . . . . . . . . ↔ . . . . . ♥
. . . . . . . . . . . . . . . . . . . . .
. ■ . . . . . . . . . . . . . . . ■ . . .
. . . . . ↕ . . . . . . . . . . . . ■ .
. . . . . ★ . . . . . . . . . . . . . .

전체 이동 횟수 = 500
남은 아이템 수 = 5
        허접한좀비§:6:0
        뱀파이어짱★:40:0
        어쩌다귀신♥:38:7
        못먹어도고↔:13:0
        못먹어세로↕:8:4
        미래의인류♀:18:10
------게임 종료------------

[1위] 이름을 입력하세요 : wldbs1
```

MonsterWorldGame.cpp | VariousMonsters.h | MonsterWorld.h | RankingBoard.h | Monster.h | Matrix.h | Point.h | FileException.h | Canvas.h

Week11_Homework3 — Matrix

```
        }
    }
    void setRand(int val = 100) {
        if (mat != NULL)
        {
            for (int i = 0; i < rows; i++)
                for (int j = 0; j < cols; j++)
                    mat[i][j] = (rand() % val);
        }
    }
};
```

79 % — No issues found

Microsoft Visual Studio Debug Console

```
. . . . . ★. . . . . .

전체 이동 횟수 = 500
남은 아이템 수 = 5
        허접한좀비§:6:0
        뱀파이어짱★:40:0
        어쩌다귀신♥:38:7
        못먹어도고↔:13:0
        못먹어세로↕:8:4
        미래의인류♀:18:10
------게임 종료------------

[1위] 이름을 입력하세요 : wldbs1

[게임 랭킹 : 종료]
[1위]wldbs1     18 0.75
[2위]신인류     0 0
[3위]신인류     0 0
[4위]신인류     0 0
[5위]신인류     0 0
엔터를 입력하세요.
 Zombie§6거리:7.82843
 Vampire★40거리:322
 KGhost♥38거리:885.128
 Jangshi↔13거리:413
 Jangshi↕8거리:381
[Human ]♀18거리:24

C:₩Users₩user₩source₩repos₩Week11_Homework3₩x64₩Debug₩Week11_Homework3.exe (proc
Press any key to close this window . . .
```

MonsterWorldGame.cpp | VariousMonsters.h | MonsterWorld.h | RankingBoard.h | Monster.h | Matrix.h | Point.h | FileException.h | Canvas.h

Week11_Homework3 — Point

```
#pragma once
#include <iostream>
#include <cmath>
using namespace std;

class Point
{
    int x, y;
    friend class Monster;
    friend class Canvas;
public:
    Point(int xx = 0, int yy = 0) :x(xx), y(yy) { }

    int& operator[] (int id) {
        if (id == 0) return x;
        else if (id == 1) return y;
        else exit(0);
    }
    operator double() { return sqrt((double)x * x + y * y); }
    void operator() (int maxx, int maxy) {
        if (x < 0) x = 0;
        if (x >= maxx) x = maxx - 1;
        if (y < 0) y = 0;
        if (y >= maxy) y = maxy - 1;
    }

    Point operator- () { return Point(-x, -y); }
    bool operator== (Point& p) { return x == p.x && y == p.y; }
    bool operator!= (Point& p) { return x != p.x || y != p.y; }
    Point operator- (Point& p) { return Point(x - p.x, y - p.y); }
    Point operator+ (Point& p) { return Point(x + p.x, y + p.y); }
    void operator+= (Point& p) { x += p.x, y += p.y; }
    void operator-= (Point& p) { x -= p.x, y -= p.y; }
};
```

79 % — 0 — 1

C:₩Users₩user₩source₩repos₩Week11_Homework3₩x64₩Debug₩Week11_Homework3.exe

```
[게임 랭킹 : 시작]
[1위]wldbs1     18 0.75
[2위]신인류     0 0
[3위]신인류     0 0
[4위]신인류     0 0
[5위]신인류     0 0
엔터를 입력하세요.
```

MonsterWorldGame.cpp | VariousMonsters.h | MonsterWorld.h | RankingBoard.h | Monster.h | Matrix.h | Point.h | FileException.h | Canvas.h

Week11_Homework3 — FileException

```
#pragma once
#include <string>
using namespace std;

struct FileException
{
    string filename;
    bool bRead;
    FileException(string name, bool b) : filename(name), bRead(b) {}
};
```

79 % — No issues found

Microsoft Visual Studio Debug Console

```
. . . . . .

전체 이동 횟수 = 229
남은 아이템 수 = 0
        허접한좀비§:1:0
        뱀파이어짱★:22:2
        어쩌다귀신♥:19:8
        못먹어도고↔:10:4
        못먹어세로↕:7:7
        미래의인류♀:69:10
------게임 종료------------

[1위] 이름을 입력하세요 : wldbs2

[게임 랭킹 : 종료]
[1위]wldbs2     69 0.539062
[2위]wldbs1     18 0.75
[3위]신인류     0 0
[4위]신인류     0 0
[5위]신인류     0 0
엔터를 입력하세요.
 Zombie§1거리:6.08276
 Vampire★22거리:147
 KGhost♥19거리:423.474
 Jangshi↔10거리:193
 Jangshi↕7거리:191
[Human ]♀69거리:128

C:₩Users₩user₩source₩repos₩Week11_Homework3₩x64₩Debug₩Week11_Homework3.exe (process 3788) exit
Press any key to close this window . . .
```

MonsterWorldGame.cpp | VariousMonsters.h | MonsterWorld.h | RankingBoard.h | Monster.h | Matrix.h | Point.h | FileException.h | Canvas.h

Week11_Homework3 | Canvas

```cpp
#pragma once
#include <iostream>
#include <string>
#include "Point.h"
#define MAXLINES 100
using namespace std;

class Canvas
{
    string line[MAXLINES];
    int xMax, yMax;
public:
    Canvas(int nx = 10, int ny = 10) : xMax(nx), yMax(ny) {
        for (int y = 0; y < yMax; y++)
            line[y] = string(xMax * 2, ' ');
    }
    void draw(int x, int y, string val) {
        if (x >= 0 && y >= 0 && x < xMax && y < yMax)
            line[y].replace(x * 2, 2, val);
    }
    void draw(Point& p, string val) { draw(p.x, p.y, val); }
    void clear(string val = "  ") {
        for (int y = 0; y < yMax; y++)
            for (int x = 0; x < xMax; x++)
                draw(x, y, val);
    }
    void print(const char* title = "<My Canvas>") {
        system("cls");
        cout << title << endl;
        for (int y = 0; y < yMax; y++)
            cout << line[y] << endl;
        cout << endl;
    }
};
```

79 % | 0 | 2 | Ln: 34 | Ch: 3 | TABS | CRLF