2022 년 2 학기 게임 프로그래밍 입문 (실습 1)

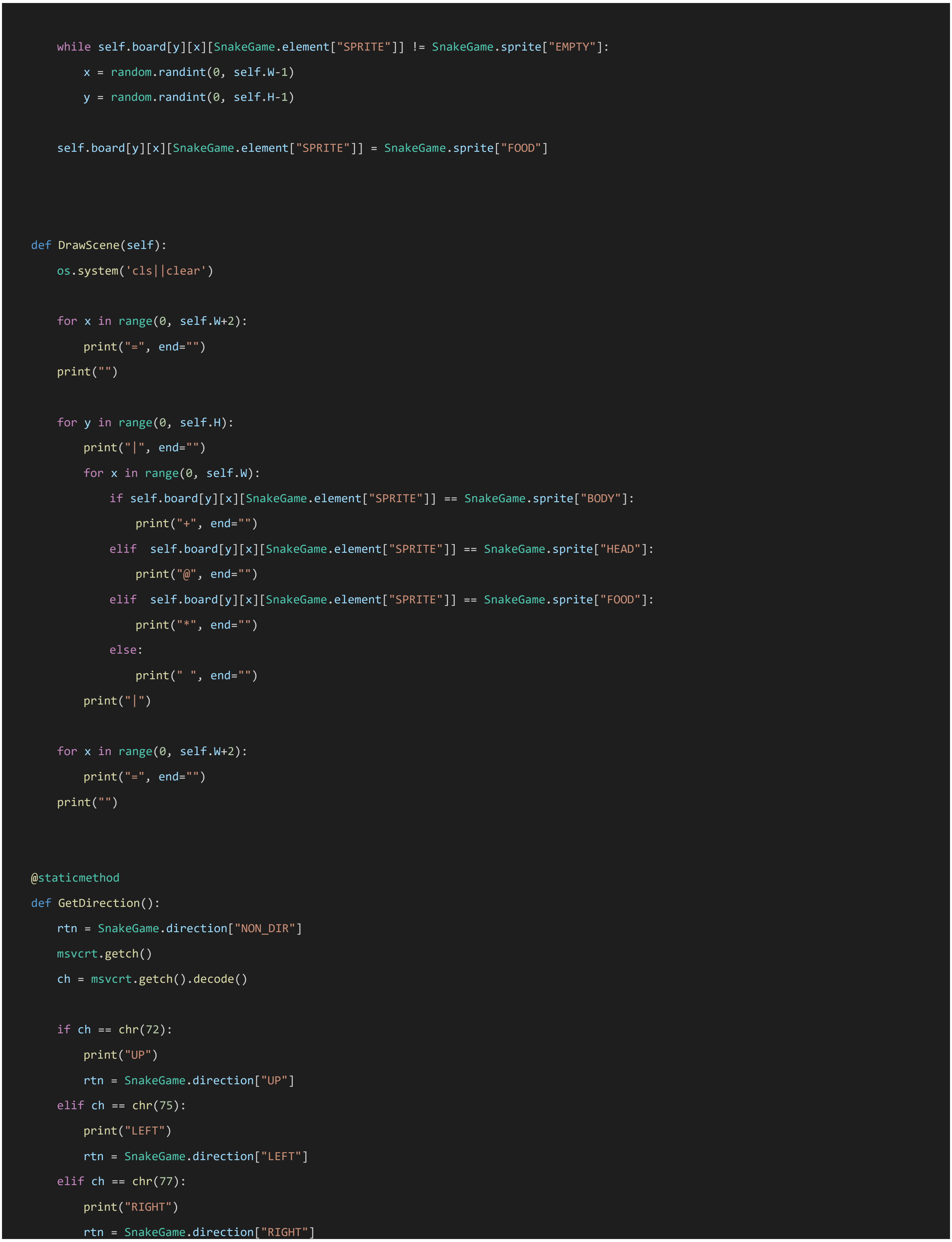
이름: 정은성 학과: 원자력공학과 학번: 2021103751

1. Snake Game

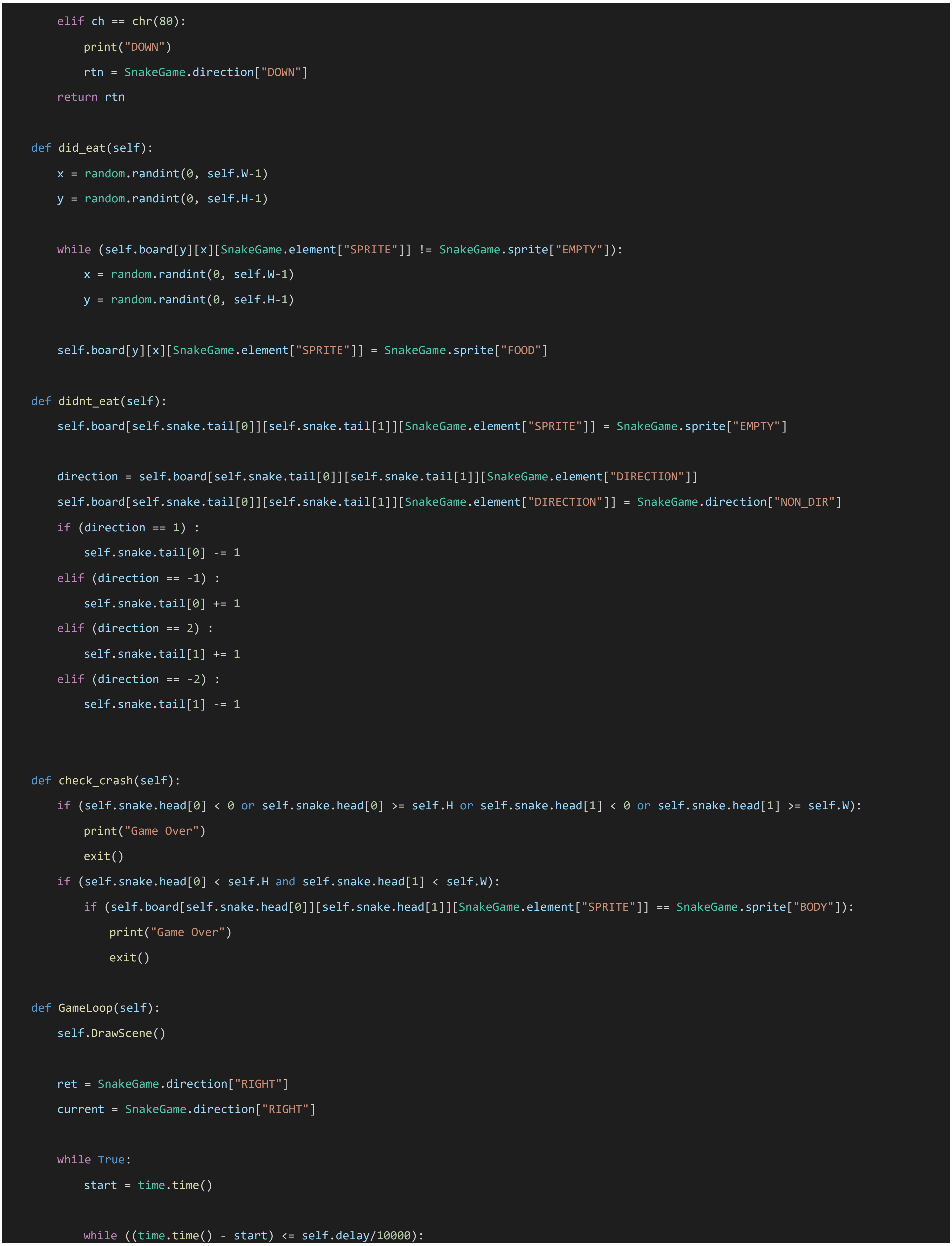
Code] (주석이나 설명 포함)

1.Original Ver

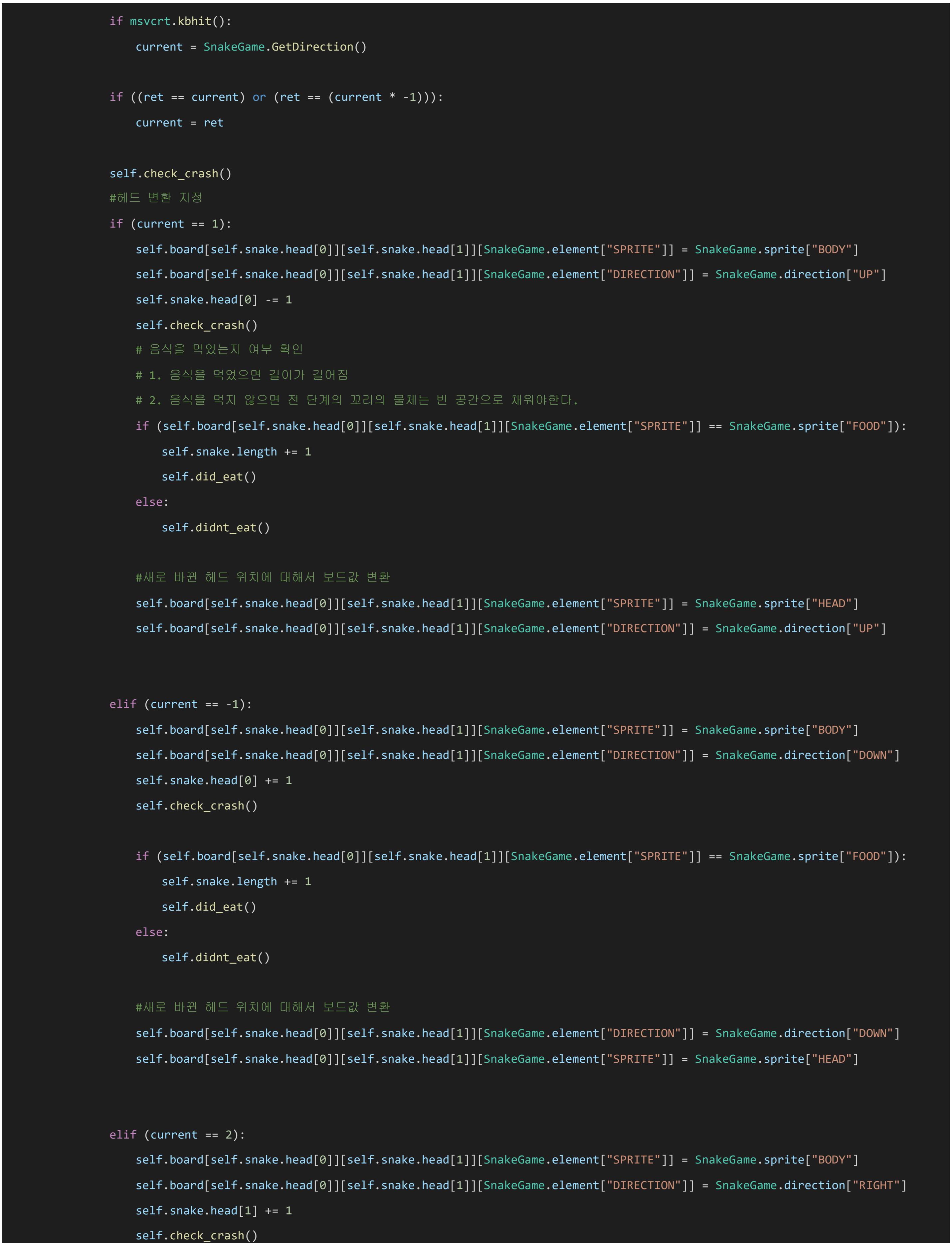
```
# -*- coding: utf8 -*-
from __future__ import print_function
import random
import os
import re
from tabnanny import check
import time
import msvcrt

class Snake:
    def __init__(self, n):
        self.length = n
        self.head = []
        self.tail = []

class SnakeGame:
    direction = {"LEFT":-2, "DOWN":-1, "NON_DIR":0, "UP":1, "RIGHT":2}
    sprite = {"EMPTY":0, "BODY":1, "HEAD":2, "FOOD":3}
    element = {"SPRITE":0, "DIRECTION":1}

    def __init__(self, w, h, length, delay):
        self.W = w
        self.H = h
        self.initLen = length
        self.snake = Snake(length)
        self.delay = delay
        self.board = [[[0]*2 for x in range(self.W)] for y in range(self.H)]
        #self.board[a][b][c]

        #세로 / 가로
        self.snake.head = [self.H//2, self.snake.length-1]
        self.snake.tail = [self.H//2, 0]

        for i in range(0, self.snake.length):
            self.board[self.H//2][i][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["BODY"]
            self.board[self.H//2][i][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["RIGHT"]

        self.board[self.H//2][self.snake.length-1][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["HEAD"]
        self.board[self.H//2][self.snake.length-1][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["RIGHT"]

        x = random.randint(0, self.W-1)
        y = random.randint(0, self.H-1)
```



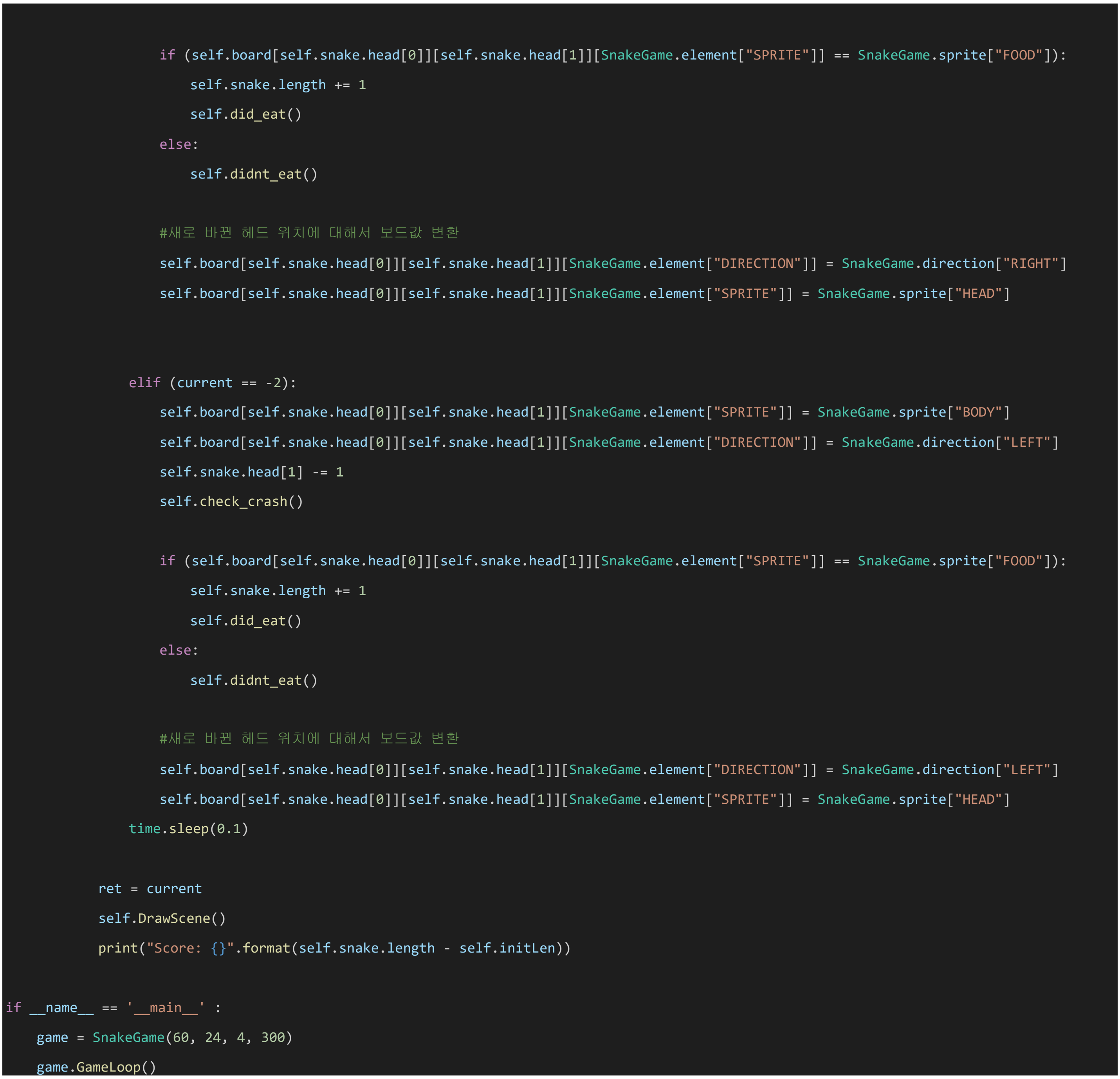
```
        while self.board[y][x][SnakeGame.element["SPRITE"]] != SnakeGame.sprite["EMPTY"]:
            x = random.randint(0, self.W-1)
            y = random.randint(0, self.H-1)

        self.board[y][x][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["FOOD"]



    def DrawScene(self):
        os.system('cls||clear')

        for x in range(0, self.W+2):
            print("=", end="")
        print("")

        for y in range(0, self.H):
            print("|", end="")
            for x in range(0, self.W):
                if self.board[y][x][SnakeGame.element["SPRITE"]] == SnakeGame.sprite["BODY"]:
                    print("+", end="")
                elif  self.board[y][x][SnakeGame.element["SPRITE"]] == SnakeGame.sprite["HEAD"]:
                    print("@", end="")
                elif  self.board[y][x][SnakeGame.element["SPRITE"]] == SnakeGame.sprite["FOOD"]:
                    print("*", end="")
                else:
                    print(" ", end="")
            print("|")

        for x in range(0, self.W+2):
            print("=", end="")
        print("")


    @staticmethod
    def GetDirection():
        rtn = SnakeGame.direction["NON_DIR"]
        msvcrt.getch()
        ch = msvcrt.getch().decode()

        if ch == chr(72):
            print("UP")
            rtn = SnakeGame.direction["UP"]
        elif ch == chr(75):
            print("LEFT")
            rtn = SnakeGame.direction["LEFT"]
        elif ch == chr(77):
            print("RIGHT")
            rtn = SnakeGame.direction["RIGHT"]
```



```
        elif ch == chr(80):
            print("DOWN")
            rtn = SnakeGame.direction["DOWN"]
        return rtn

    def did_eat(self):
        x = random.randint(0, self.W-1)
        y = random.randint(0, self.H-1)

        while (self.board[y][x][SnakeGame.element["SPRITE"]] != SnakeGame.sprite["EMPTY"]):
            x = random.randint(0, self.W-1)
            y = random.randint(0, self.H-1)

        self.board[y][x][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["FOOD"]

    def didnt_eat(self):
        self.board[self.snake.tail[0]][self.snake.tail[1]][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["EMPTY"]

        direction = self.board[self.snake.tail[0]][self.snake.tail[1]][SnakeGame.element["DIRECTION"]]
        self.board[self.snake.tail[0]][self.snake.tail[1]][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["NON_DIR"]
        if (direction == 1) :
            self.snake.tail[0] -= 1
        elif (direction == -1) :
            self.snake.tail[0] += 1
        elif (direction == 2) :
            self.snake.tail[1] += 1
        elif (direction == -2) :
            self.snake.tail[1] -= 1



    def check_crash(self):
        if (self.snake.head[0] < 0 or self.snake.head[0] >= self.H or self.snake.head[1] < 0 or self.snake.head[1] >= self.W):
            print("Game Over")
            exit()
        if (self.snake.head[0] < self.H and self.snake.head[1] < self.W):
            if (self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] == SnakeGame.sprite["BODY"]):
                print("Game Over")
                exit()

    def GameLoop(self):
        self.DrawScene()

        ret = SnakeGame.direction["RIGHT"]
        current = SnakeGame.direction["RIGHT"]

        while True:
            start = time.time()

            while ((time.time() - start) <= self.delay/10000):
```



```
        if msvcrt.kbhit():
            current = SnakeGame.GetDirection()

        if ((ret == current) or (ret == (current * -1))):
            current = ret

        self.check_crash()
        #헤드 변환 지정
        if (current == 1):
            self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["BODY"]
            self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["UP"]
            self.snake.head[0] -= 1
            self.check_crash()
            # 음식을 먹었는지 여부 확인
            # 1. 음식을 먹었으면 길이가 길어짐
            # 2. 음식을 먹지 않으면 전 단계의 꼬리의 물체는 빈 공간으로 채워야한다.
            if (self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] == SnakeGame.sprite["FOOD"]):
                self.snake.length += 1
                self.did_eat()
            else:
                self.didnt_eat()

            #새로 바뀐 헤드 위치에 대해서 보드값 변환
            self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["HEAD"]
            self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["UP"]


        elif (current == -1):
            self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["BODY"]
            self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["DOWN"]
            self.snake.head[0] += 1
            self.check_crash()

            if (self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] == SnakeGame.sprite["FOOD"]):
                self.snake.length += 1
                self.did_eat()
            else:
                self.didnt_eat()

            #새로 바뀐 헤드 위치에 대해서 보드값 변환
            self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["DOWN"]
            self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["HEAD"]


        elif (current == 2):
            self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["BODY"]
            self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["RIGHT"]
            self.snake.head[1] += 1
            self.check_crash()
```



```
                    if (self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] == SnakeGame.sprite["FOOD"]):
                        self.snake.length += 1
                        self.did_eat()
                    else:
                        self.didnt_eat()

                    #새로 바뀐 헤드 위치에 대해서 보드값 변환
                    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["RIGHT"]
                    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["HEAD"]


                elif (current == -2):
                    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["BODY"]
                    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["LEFT"]
                    self.snake.head[1] -= 1
                    self.check_crash()

                    if (self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] == SnakeGame.sprite["FOOD"]):
                        self.snake.length += 1
                        self.did_eat()
                    else:
                        self.didnt_eat()

                    #새로 바뀐 헤드 위치에 대해서 보드값 변환
                    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["LEFT"]
                    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["HEAD"]
                time.sleep(0.1)

            ret = current
            self.DrawScene()
            print("Score: {}".format(self.snake.length - self.initLen))

if __name__ == '__main__' :
    game = SnakeGame(60, 24, 4, 300)
    game.GameLoop()
```

코드 분해 :

우선적으로 키를 입력 받으면 아래 코드에 걸려서 1. 같은 방향이면 누른 값을 유지 2. 반대(180도)이라도 같은 방향을 유지함.

```
                if ((ret == current) or (ret == (current * -1))):
                    current = ret
```

방향 값을 받아 이 방향에 대해서 적용된 board값을 바꿔준다.
현재 헤드값은 body값으로 바꿔준다. 또한 방향에 대해서 누른 키 값으로 변화를 준다.
그리고 헤드의 값의 위치가 1상승한다. -> 위로 올라가야 함.
이후 충돌 체크를 해준다. (나중에 따로 함수로 빼서 설명함.)
음식처리에 대한 내용은 주석으로 설명됨 (나중에 따로 함수로 빼서 설명함)
움직인 헤드의 위치의 보드 값을 헤드와 업으로 바꿔준다.

```
if (current == 1):
    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] =
SnakeGame.sprite["BODY"]
    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["DIRECTION"]] =
SnakeGame.direction["UP"]
    self.snake.head[0] -= 1
    self.check_crash()
    # 음식을 먹었는지 여부 확인
    # 1. 음식을 먹었으면 길이가 길어짐
    # 2. 음식을 먹지 않으면 전 단계의 꼬리의 물체는 빈 공간으로 채워야한다.
    if (self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] ==
SnakeGame.sprite["FOOD"]):
        self.snake.length += 1
        self.did_eat()
    else:
        self.didnt_eat()

self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] =
SnakeGame.sprite["HEAD"]
self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["DIRECTION"]] =
SnakeGame.direction["UP"]
```

만약에 먹이를 먹었다면 다시 먹이를 생성

```
def did_eat(self):
    x = random.randint(0, self.W-1)
    y = random.randint(0, self.H-1)

    while (self.board[y][x][SnakeGame.element["SPRITE"]] != SnakeGame.sprite["EMPTY"]):
        x = random.randint(0, self.W-1)
        y = random.randint(0, self.H-1)

    self.board[y][x][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["FOOD"]
```

먹이를 먹지 않았다면 꼬리를 이동해줘야 함. 먹었다면 꼬리를 움직일 필요가 없음.
먹지 않았다면 현재 꼬리의 값은 비었다고 해줬다고 해주며 현재 꼬리의 방향의 값을 direction에 담아둔다.
그리고 현재 꼬리의 방향 값을 비워준다.
담아둔 direction에 정보에 따라 꼬리의 이동을 진행한다.

```
def didnt_eat(self):
    self.board[self.snake.tail[0]][self.snake.tail[1]][SnakeGame.element["SPRITE"]] =
SnakeGame.sprite["EMPTY"]

    direction =
self.board[self.snake.tail[0]][self.snake.tail[1]][SnakeGame.element["DIRECTION"]]
    self.board[self.snake.tail[0]][self.snake.tail[1]][SnakeGame.element["DIRECTION"]] =
SnakeGame.direction["NON_DIR"]
    if (direction == 1) :
        self.snake.tail[0] -= 1
    elif (direction == -1) :
        self.snake.tail[0] += 1
    elif (direction == 2) :
        self.snake.tail[1] += 1
    elif (direction == -2) :
        self.snake.tail[1] -=
```

충돌에 대한 처리로 보드의 밖 테두리와 충돌한다면, 게임이 종료해야 한다. 또한 자신의 바디에 헤드가 닿는 다면, 종료해준다.

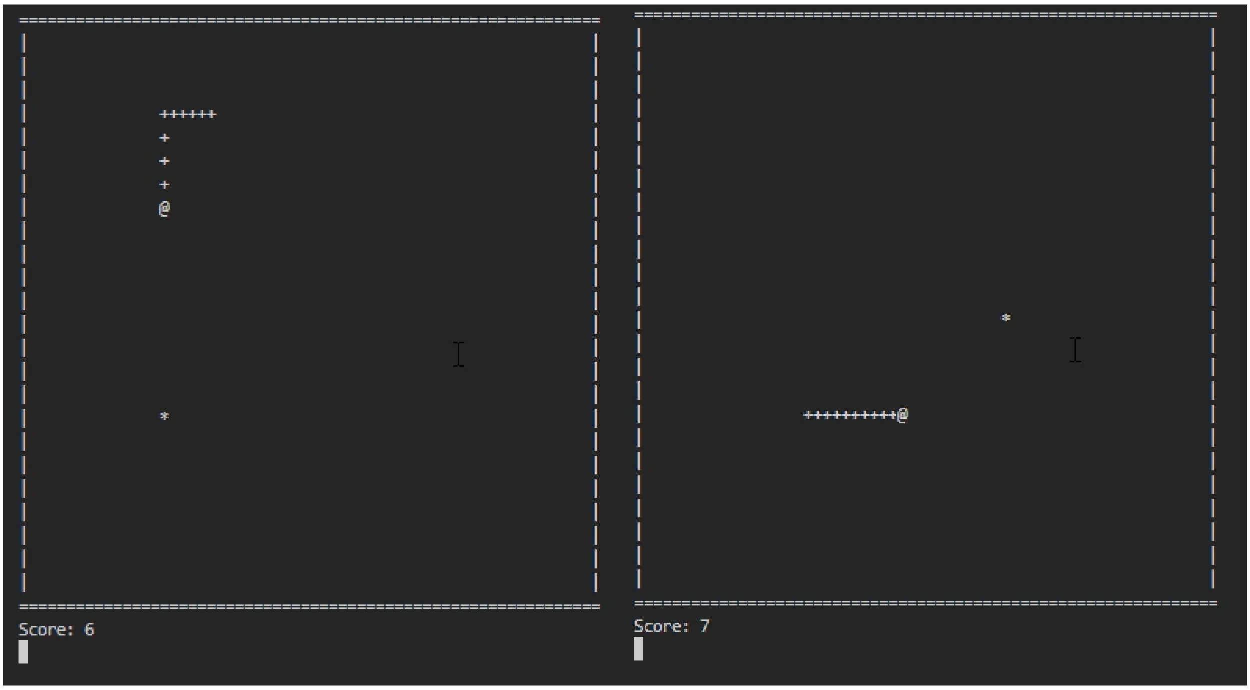
```
def check_crash(self):
    if (self.snake.head[0] < 0 or self.snake.head[0] >= self.H or self.snake.head[1] < 0 or
self.snake.head[1] >= self.W):
        print("Game Over")
        exit()
    if (self.snake.head[0] < self.H and self.snake.head[1] < self.W):
        if (self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]]
== SnakeGame.sprite["BODY"]):
            print("Game Over")
            exit()
```

Run] Screen shot

2022 년 2 학기 게임 프로그래밍 입문 (실습 1)

이름:	정은성	학과:	원자력공학과	학번:	2021103751

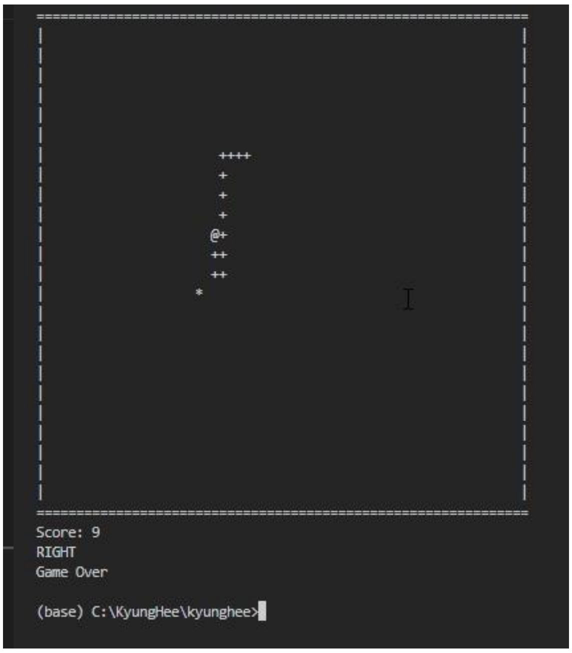
먹이를 먹었을 때 꼬리 생성 확인 및 먹이 랜덤 생성 확인



```
Score: 6
```

```
Score: 7
```

헤드가 자신의 머리와 충돌 시 Game Over

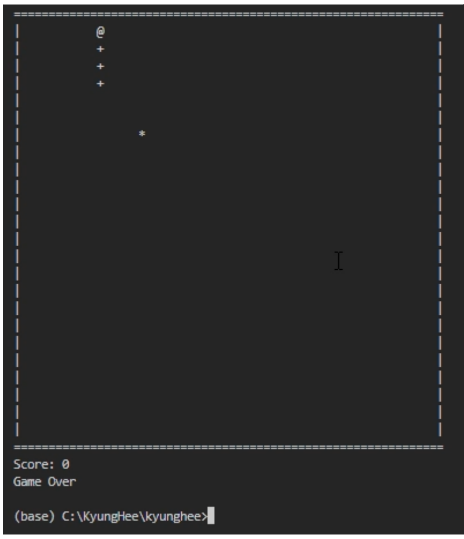


```
Score: 9
RIGHT
Game Over

(base) C:\KyungHee\kyunghee>
```

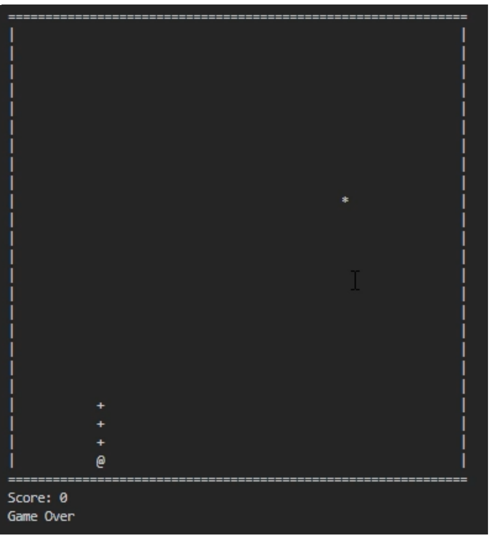
2022 년 2 학기 게임 프로그래밍 입문 (실습 1)

이름: 정은성 학과: 원자력공학과 학번: 2021103751

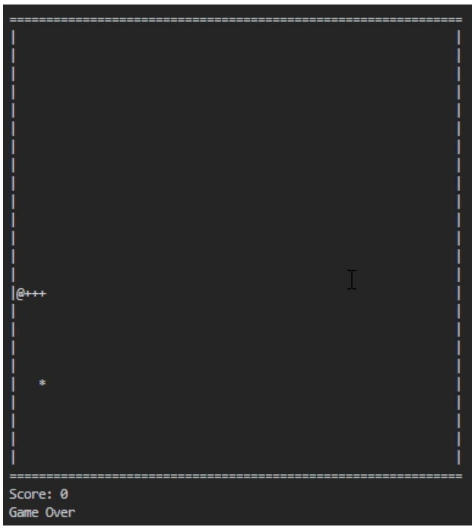
상하좌우 보드 충돌 체크



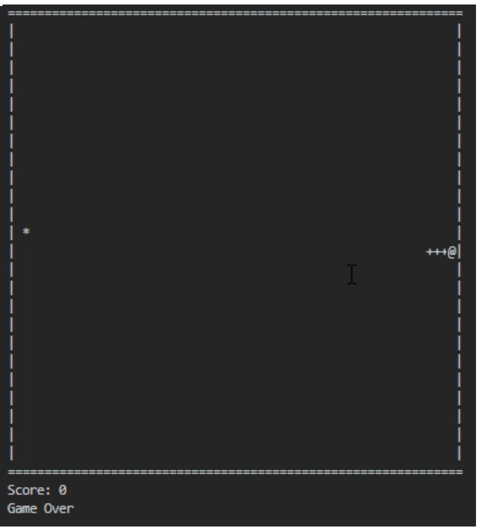
```
Score: 0
Game Over

(base) C:\KyungHee\kyunghee>
```



```
Score: 0
Game Over
```



```
Score: 0
Game Over
```

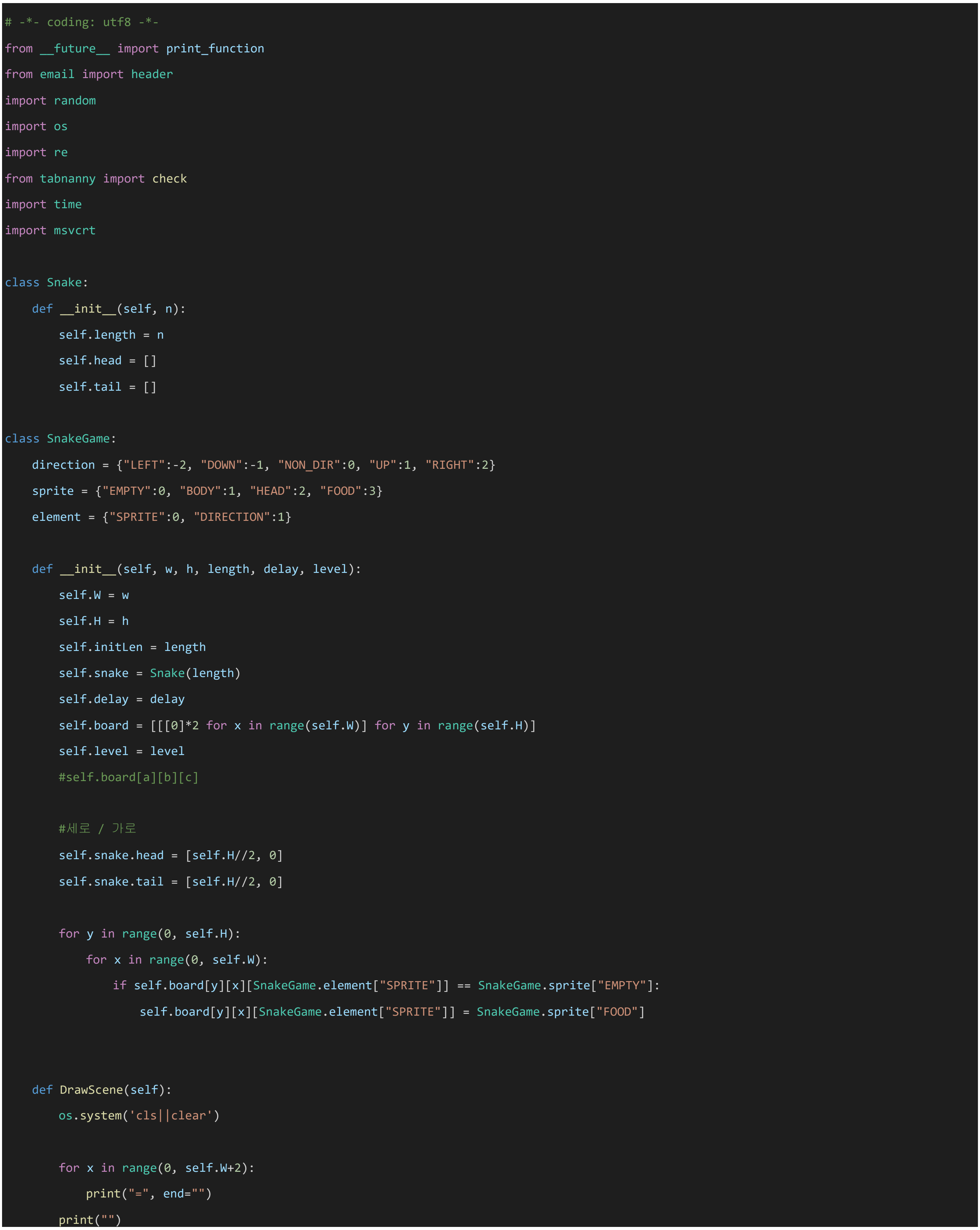


```
Score: 0
Game Over
```

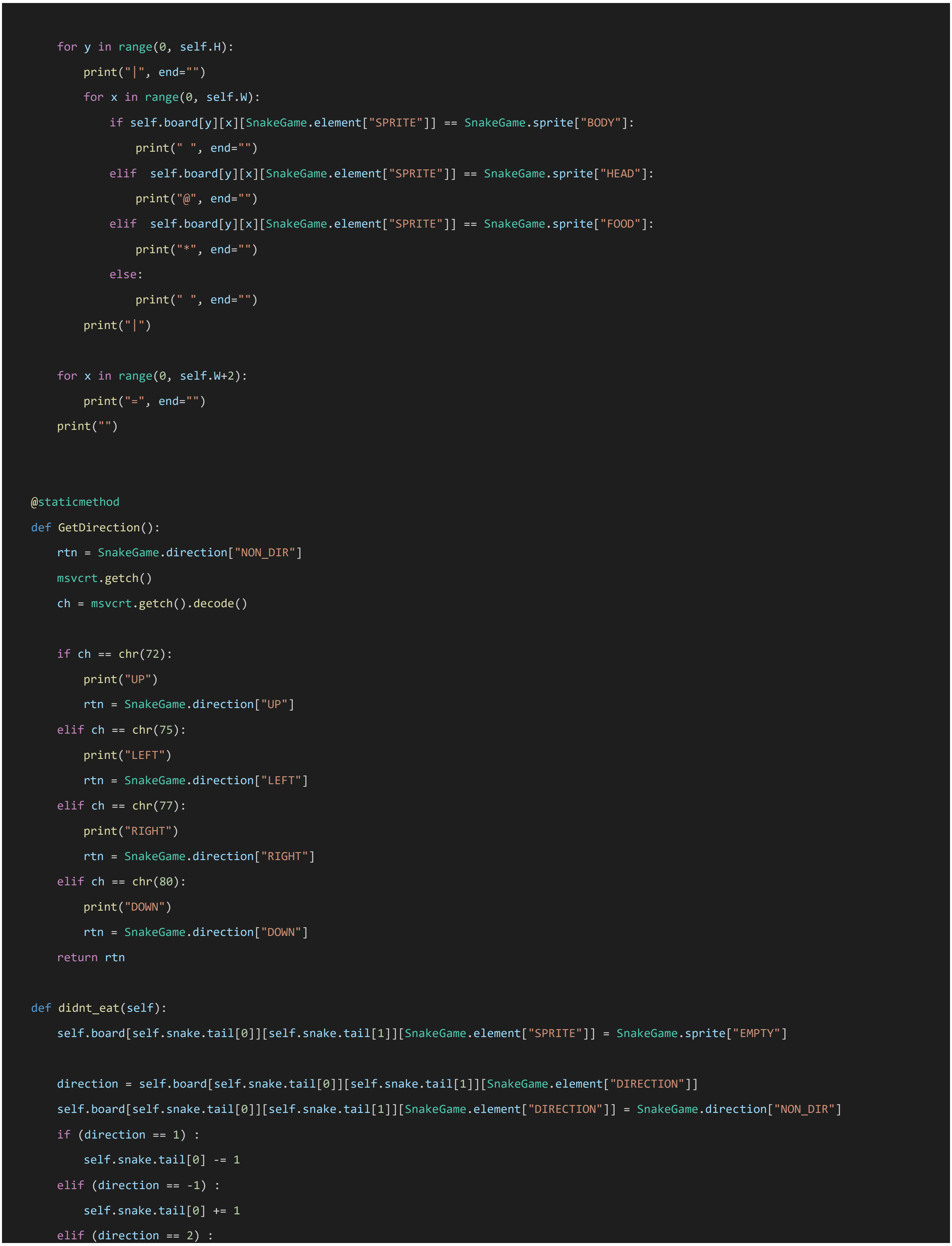
2022 년 2 학기 게임 프로그래밍 입문 (실습 1)

이름:	정은성	학과:	원자력공학과	학번:	2021103751

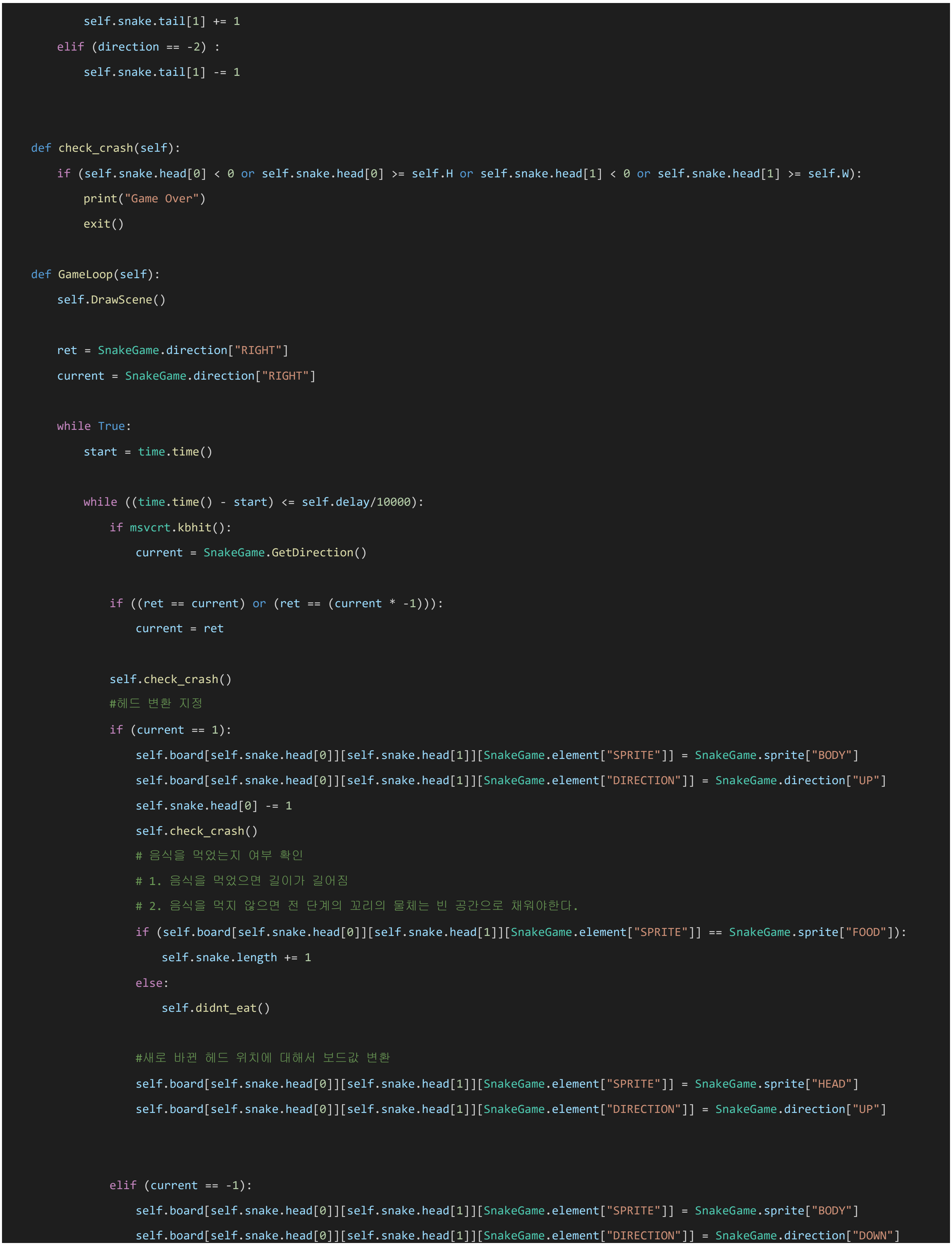
2. Eat All Ver : 채워져 있는 먹이를 모두 먹는 버전



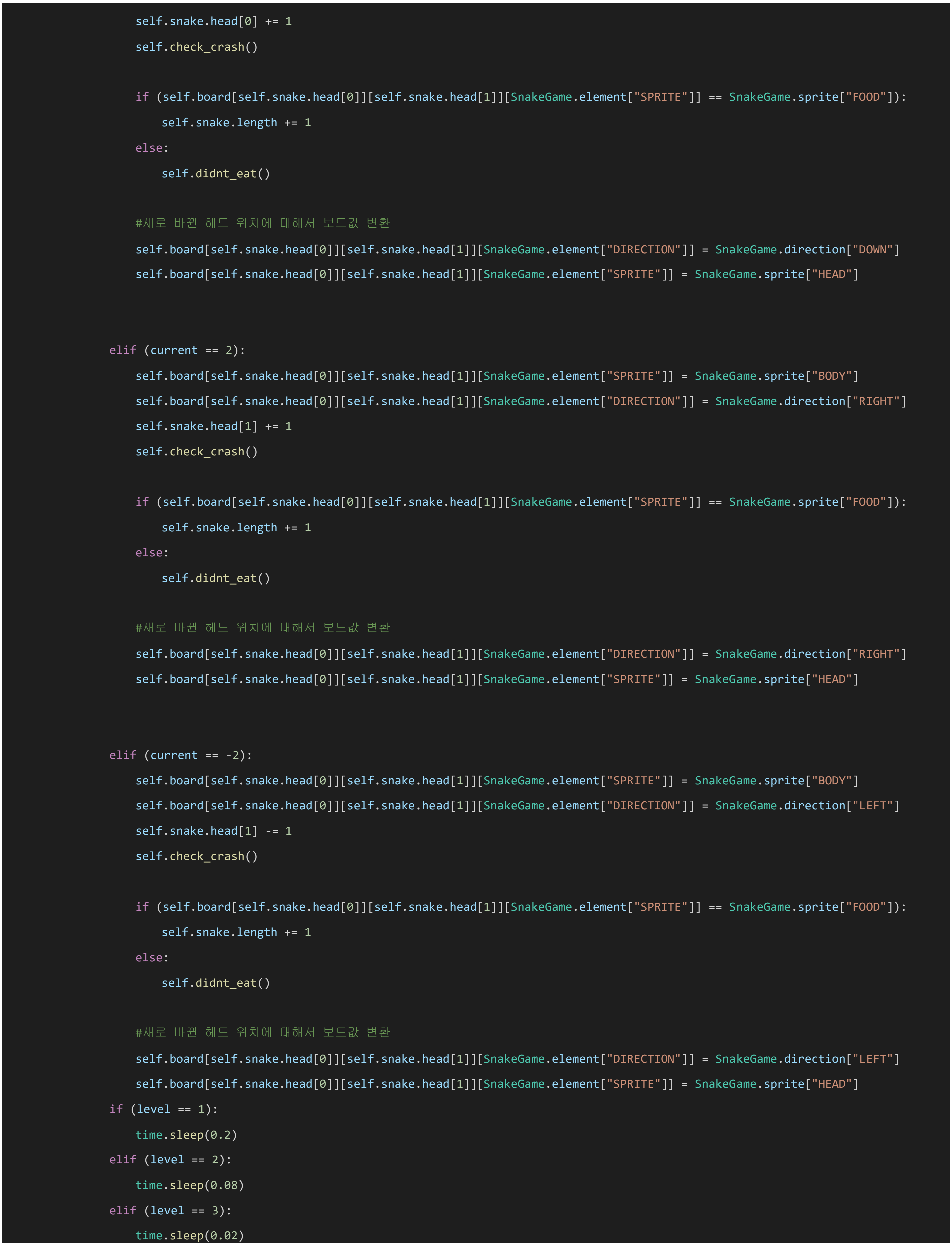
```python
# -*- coding: utf8 -*-
from __future__ import print_function
from email import header
import random
import os
import re
from tabnanny import check
import time
import msvcrt

class Snake:
    def __init__(self, n):
        self.length = n
        self.head = []
        self.tail = []

class SnakeGame:
    direction = {"LEFT":-2, "DOWN":-1, "NON_DIR":0, "UP":1, "RIGHT":2}
    sprite = {"EMPTY":0, "BODY":1, "HEAD":2, "FOOD":3}
    element = {"SPRITE":0, "DIRECTION":1}

    def __init__(self, w, h, length, delay, level):
        self.W = w
        self.H = h
        self.initLen = length
        self.snake = Snake(length)
        self.delay = delay
        self.board = [[[0]*2 for x in range(self.W)] for y in range(self.H)]
        self.level = level
        #self.board[a][b][c]

        #세로 / 가로
        self.snake.head = [self.H//2, 0]
        self.snake.tail = [self.H//2, 0]

        for y in range(0, self.H):
            for x in range(0, self.W):
                if self.board[y][x][SnakeGame.element["SPRITE"]] == SnakeGame.sprite["EMPTY"]:
                    self.board[y][x][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["FOOD"]


    def DrawScene(self):
        os.system('cls||clear')

        for x in range(0, self.W+2):
            print("=", end="")
        print("")
```



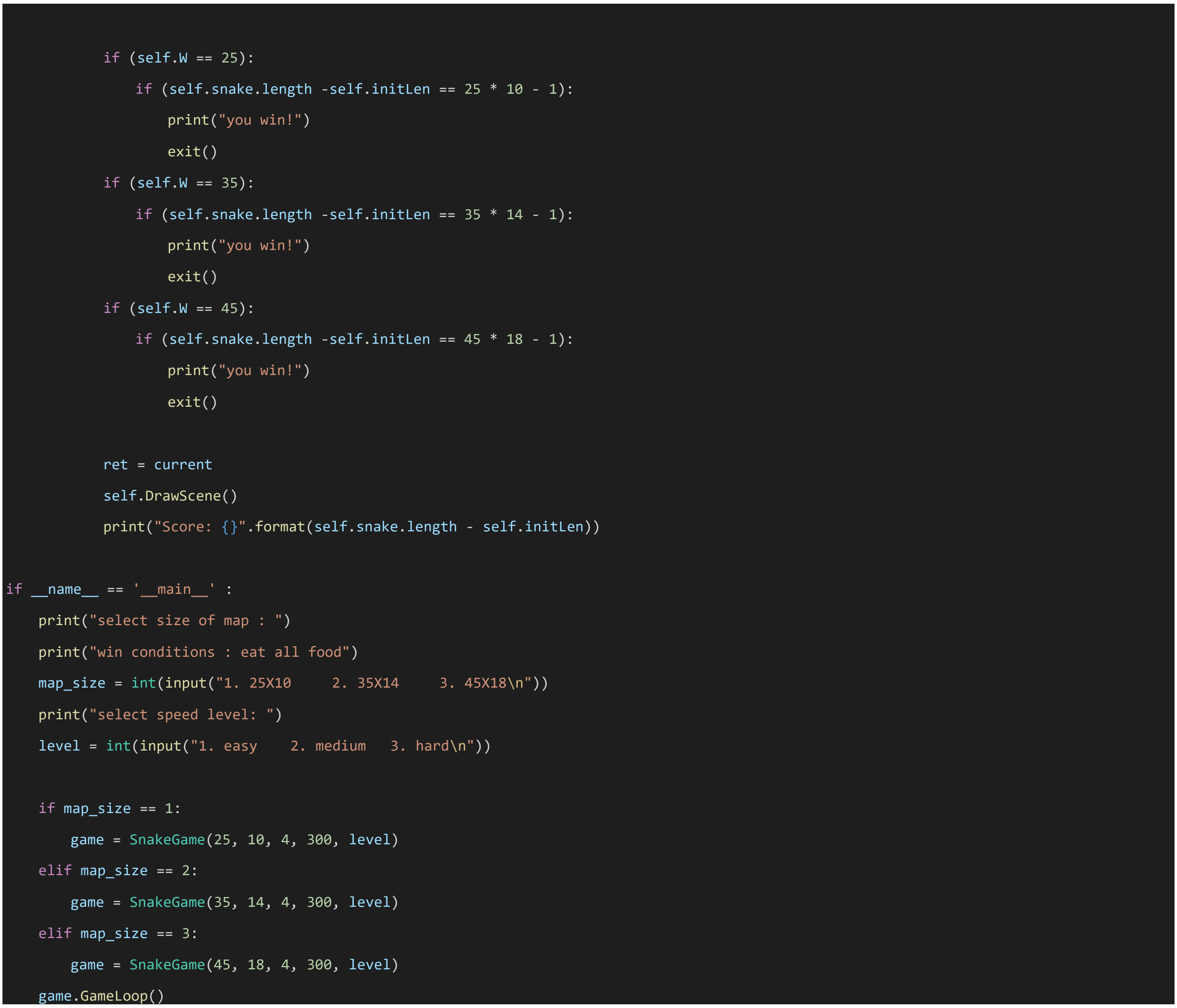
```
        for y in range(0, self.H):
            print("|", end="")
            for x in range(0, self.W):
                if self.board[y][x][SnakeGame.element["SPRITE"]] == SnakeGame.sprite["BODY"]:
                    print(" ", end="")
                elif  self.board[y][x][SnakeGame.element["SPRITE"]] == SnakeGame.sprite["HEAD"]:
                    print("@", end="")
                elif  self.board[y][x][SnakeGame.element["SPRITE"]] == SnakeGame.sprite["FOOD"]:
                    print("*", end="")
                else:
                    print(" ", end="")
            print("|")

        for x in range(0, self.W+2):
            print("=", end="")
        print("")


    @staticmethod
    def GetDirection():
        rtn = SnakeGame.direction["NON_DIR"]
        msvcrt.getch()
        ch = msvcrt.getch().decode()

        if ch == chr(72):
            print("UP")
            rtn = SnakeGame.direction["UP"]
        elif ch == chr(75):
            print("LEFT")
            rtn = SnakeGame.direction["LEFT"]
        elif ch == chr(77):
            print("RIGHT")
            rtn = SnakeGame.direction["RIGHT"]
        elif ch == chr(80):
            print("DOWN")
            rtn = SnakeGame.direction["DOWN"]
        return rtn

    def didnt_eat(self):
        self.board[self.snake.tail[0]][self.snake.tail[1]][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["EMPTY"]

        direction = self.board[self.snake.tail[0]][self.snake.tail[1]][SnakeGame.element["DIRECTION"]]
        self.board[self.snake.tail[0]][self.snake.tail[1]][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["NON_DIR"]
        if (direction == 1) :
            self.snake.tail[0] -= 1
        elif (direction == -1) :
            self.snake.tail[0] += 1
        elif (direction == 2) :
```



```
            self.snake.tail[1] += 1
        elif (direction == -2) :
            self.snake.tail[1] -= 1


    def check_crash(self):
        if (self.snake.head[0] < 0 or self.snake.head[0] >= self.H or self.snake.head[1] < 0 or self.snake.head[1] >= self.W):
            print("Game Over")
            exit()

    def GameLoop(self):
        self.DrawScene()

        ret = SnakeGame.direction["RIGHT"]
        current = SnakeGame.direction["RIGHT"]

        while True:
            start = time.time()

            while ((time.time() - start) <= self.delay/10000):
                if msvcrt.kbhit():
                    current = SnakeGame.GetDirection()

                if ((ret == current) or (ret == (current * -1))):
                    current = ret

                self.check_crash()
                #헤드 변환 지정
                if (current == 1):
                    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["BODY"]
                    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["UP"]
                    self.snake.head[0] -= 1
                    self.check_crash()
                    # 음식을 먹었는지 여부 확인
                    # 1. 음식을 먹었으면 길이가 길어짐
                    # 2. 음식을 먹지 않으면 전 단계의 꼬리의 물체는 빈 공간으로 채워야한다.
                    if (self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] == SnakeGame.sprite["FOOD"]):
                        self.snake.length += 1
                    else:
                        self.didnt_eat()

                    #새로 바뀐 헤드 위치에 대해서 보드값 변환
                    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["HEAD"]
                    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["UP"]


                elif (current == -1):
                    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["BODY"]
                    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["DOWN"]
```



```
            self.snake.head[0] += 1
            self.check_crash()

            if (self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] == SnakeGame.sprite["FOOD"]):
                self.snake.length += 1
            else:
                self.didnt_eat()

            #새로 바뀐 헤드 위치에 대해서 보드값 변환
            self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["DOWN"]
            self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["HEAD"]



        elif (current == 2):
            self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["BODY"]
            self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["RIGHT"]
            self.snake.head[1] += 1
            self.check_crash()

            if (self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] == SnakeGame.sprite["FOOD"]):
                self.snake.length += 1
            else:
                self.didnt_eat()

            #새로 바뀐 헤드 위치에 대해서 보드값 변환
            self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["RIGHT"]
            self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["HEAD"]



        elif (current == -2):
            self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["BODY"]
            self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["LEFT"]
            self.snake.head[1] -= 1
            self.check_crash()

            if (self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] == SnakeGame.sprite["FOOD"]):
                self.snake.length += 1
            else:
                self.didnt_eat()

            #새로 바뀐 헤드 위치에 대해서 보드값 변환
            self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["LEFT"]
            self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["HEAD"]
        if (level == 1):
            time.sleep(0.2)
        elif (level == 2):
            time.sleep(0.08)
        elif (level == 3):
            time.sleep(0.02)
```



```
            if (self.W == 25):
                if (self.snake.length -self.initLen == 25 * 10 - 1):
                    print("you win!")
                    exit()
            if (self.W == 35):
                if (self.snake.length -self.initLen == 35 * 14 - 1):
                    print("you win!")
                    exit()
            if (self.W == 45):
                if (self.snake.length -self.initLen == 45 * 18 - 1):
                    print("you win!")
                    exit()

            ret = current
            self.DrawScene()
            print("Score: {}".format(self.snake.length - self.initLen))

if __name__ == '__main__' :
    print("select size of map : ")
    print("win conditions : eat all food")
    map_size = int(input("1. 25X10     2. 35X14     3. 45X18\n"))
    print("select speed level: ")
    level = int(input("1. easy    2. medium   3. hard\n"))

    if map_size == 1:
        game = SnakeGame(25, 10, 4, 300, level)
    elif map_size == 2:
        game = SnakeGame(35, 14, 4, 300, level)
    elif map_size == 3:
        game = SnakeGame(45, 18, 4, 300, level)
    game.GameLoop()
```

2022 년 2 학기 게임 프로그래밍 입문 (실습 1)

이름: 정은성 학과: 원자력공학과 학번: 2021103751

코드 분해 :

맵의 전체의 크기를 먼저 입력을 받는다.
이후 헤드의 움직임 속도를 입력받는다.

```
print("select size of map : ")
print("win conditions : eat all food")
map_size = int(input("1. 25X10     2. 35X14     3. 45X18\n"))
print("select speed level: ")
level = int(input("1. easy    2. medium   3. hard\n"))

if map_size == 1:
    game = SnakeGame(25, 10, 4, 300, level)
elif map_size == 2:
    game = SnakeGame(35, 14, 4, 300, level)
elif map_size == 3:
    game = SnakeGame(45, 18, 4, 300, level)
```

처음 맵을 전부다 음식으로 채워 넣는다.

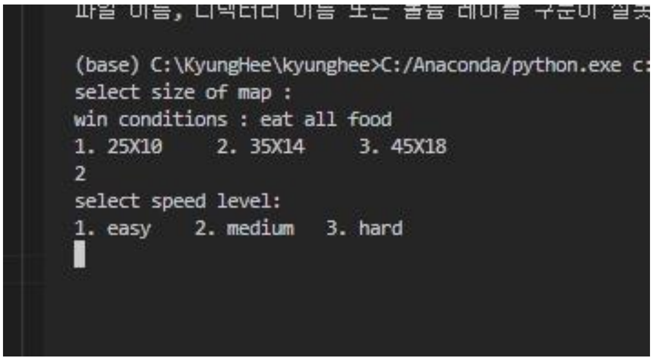
```
for y in range(0, self.H):
    for x in range(0, self.W):
        if self.board[y][x][SnakeGame.element["SPRITE"]] == SnakeGame.sprite["EMPTY"]:
            self.board[y][x][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["FOOD"]
```

레벨을 정해서 이에 따라 움직이는 속도를 정해준다.
또한 W값에 따라서 먹어야 하는 먹이의 수를 정해두고 이에 맞춰서 게임의 승리 조건을 정함.

```
if (level == 1):
    time.sleep(0.2)
elif (level == 2):
    time.sleep(0.08)
elif (level == 3):
    time.sleep(0.02)

if (self.W == 25):
if (self.snake.length -self.initLen == 25 * 10 - 1):
    print("you win!")
    exit()
if (self.W == 35):
if (self.snake.length -self.initLen == 35 * 14 - 1):
    print("you win!")
    exit()
if (self.W == 45):
if (self.snake.length -self.initLen == 45 * 18 - 1):
    print("you win!")
    exit()
```

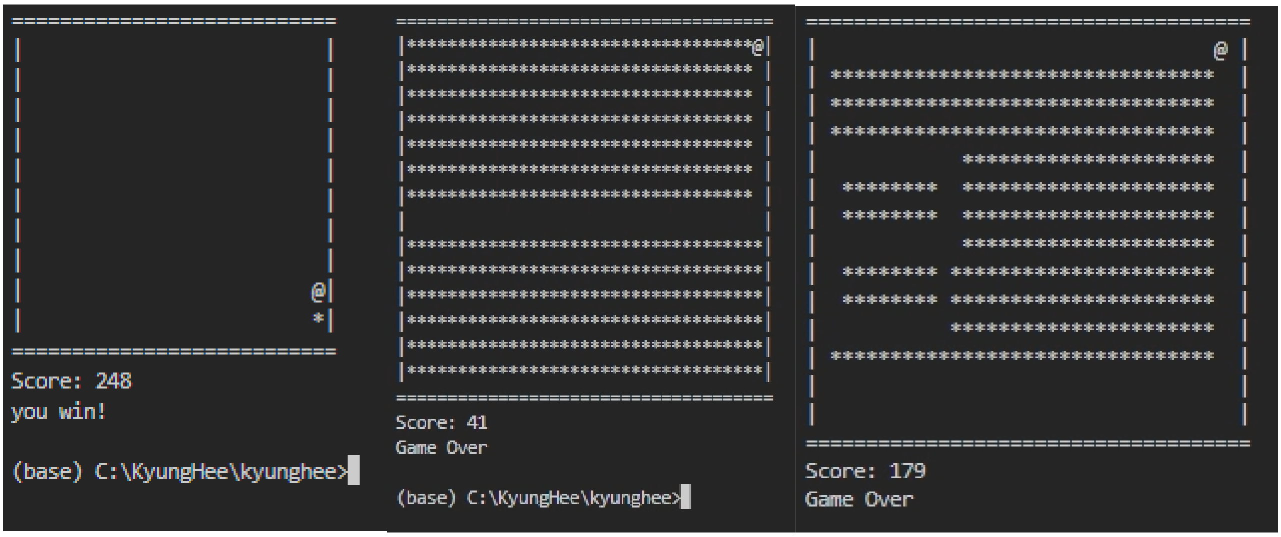
2022 년 2 학기 게임 프로그래밍 입문 (실습 1)

이름: 정은성 학과: 원자력공학과 학번: 2021103751



```
파일 이름, 디렉터리 이름 또는 볼륨 레이블 구문이 잘못

(base) C:\KyungHee\kyunghee>C:/Anaconda/python.exe c:
select size of map :
win conditions : eat all food
1. 25X10     2. 35X14     3. 45X18
2
select speed level:
1. easy    2. medium   3. hard
```

플레이 예시



```
===========================
|                         |
|                         |
|                         |
|                         |
|                         |
|                         |
|                         |
|                         |
|                        @|
|                        *|
===========================
Score: 248
you win!

(base) C:\KyungHee\kyunghee>
```

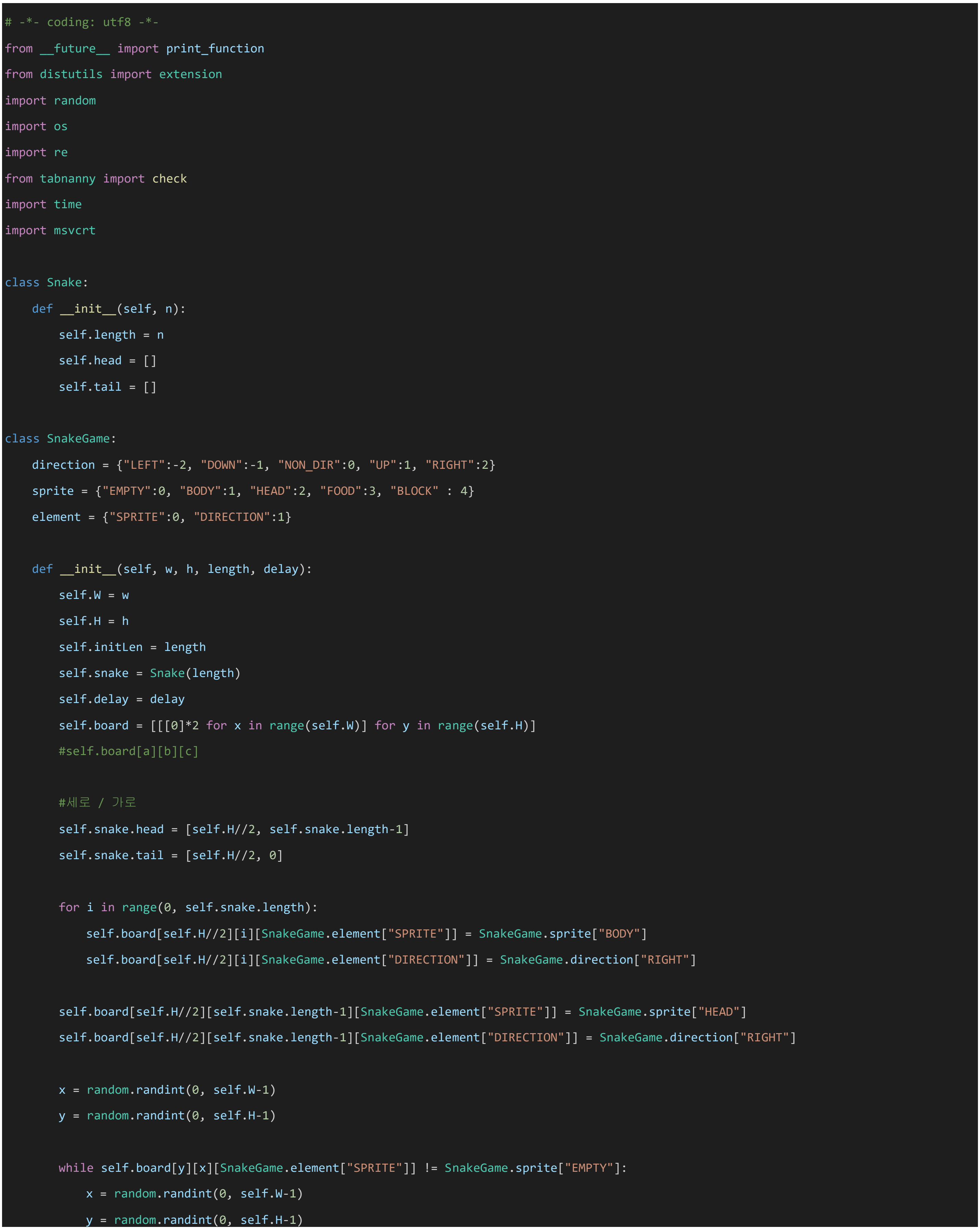
```
=====================================
|**********************************@|
|********************************** |
|********************************** |
|********************************** |
|********************************** |
|********************************** |
|********************************** |
|                                   |
|***********************************|
|***********************************|
|***********************************|
|***********************************|
|***********************************|
|***********************************|
=====================================
Score: 41
Game Over

(base) C:\KyungHee\kyunghee>
```

```
=====================================
|                                 @ |
| ********************************  |
| ********************************  |
| ********************************  |
|             ********************  |
|  *********  ********************  |
|  *********  ********************  |
|             ********************  |
|  ********* *********************  |
|  ********* *********************  |
|            *********************  |
| ********************************  |
|                                   |
|                                   |
=====================================
Score: 179
Game Over
```

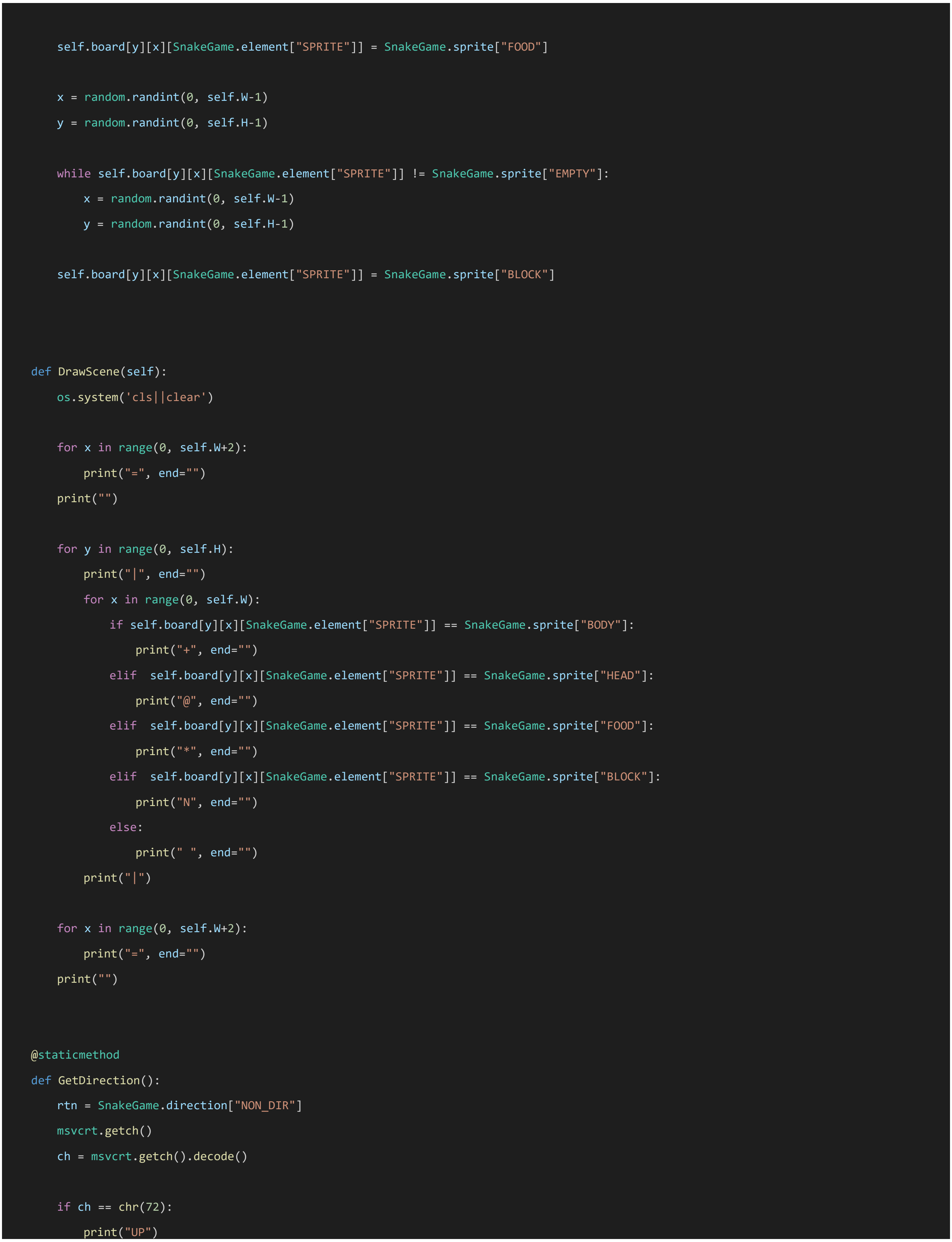
2022 년 2 학기 게임 프로그래밍 입문 (실습 1)

이름: 정은성 학과: 원자력공학과 학번: 2021103751

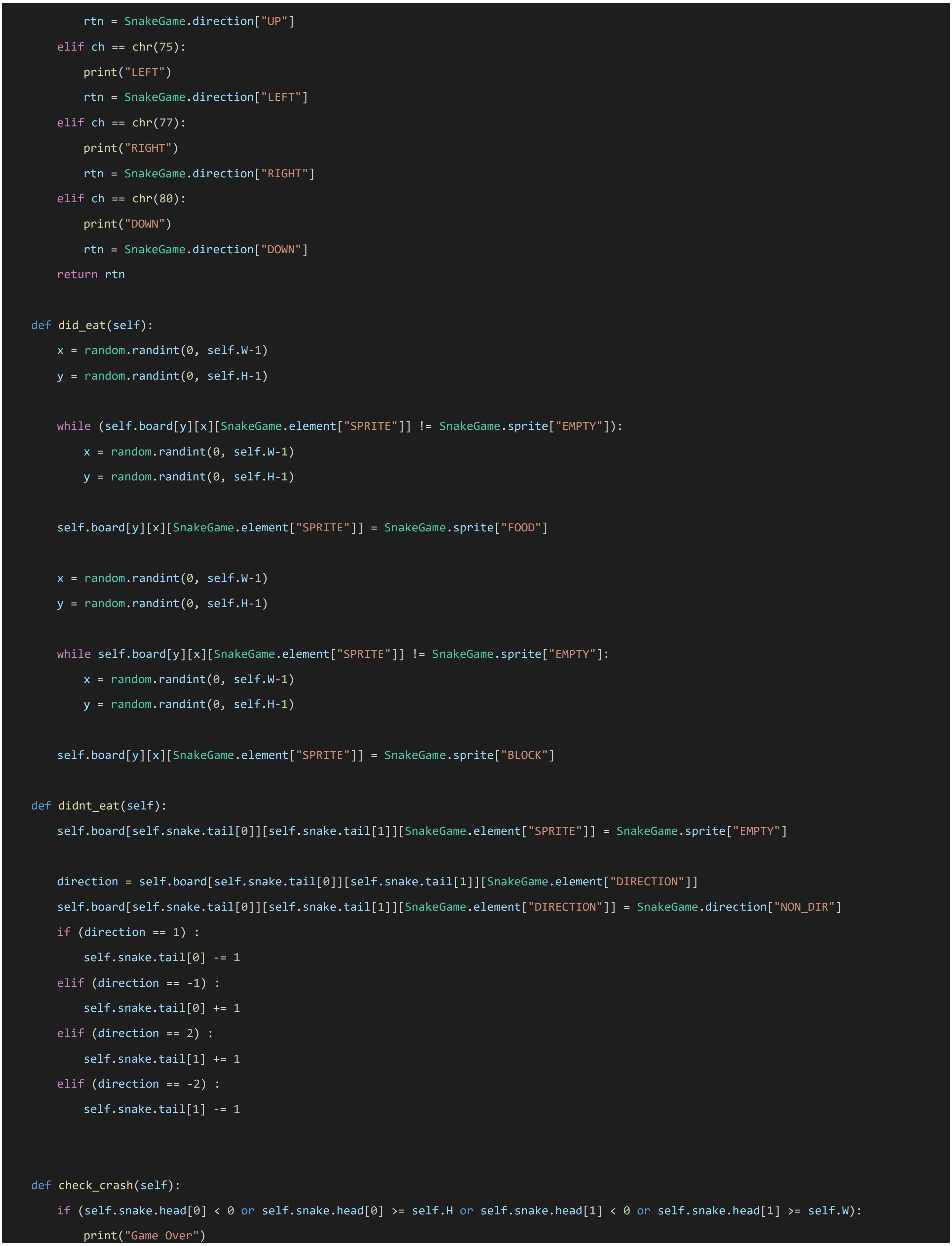
3. Block Ver : 먹이를 먹을 때마다 블록인 N이 생성된다. N과 부딛치면 게임이 종료된다.



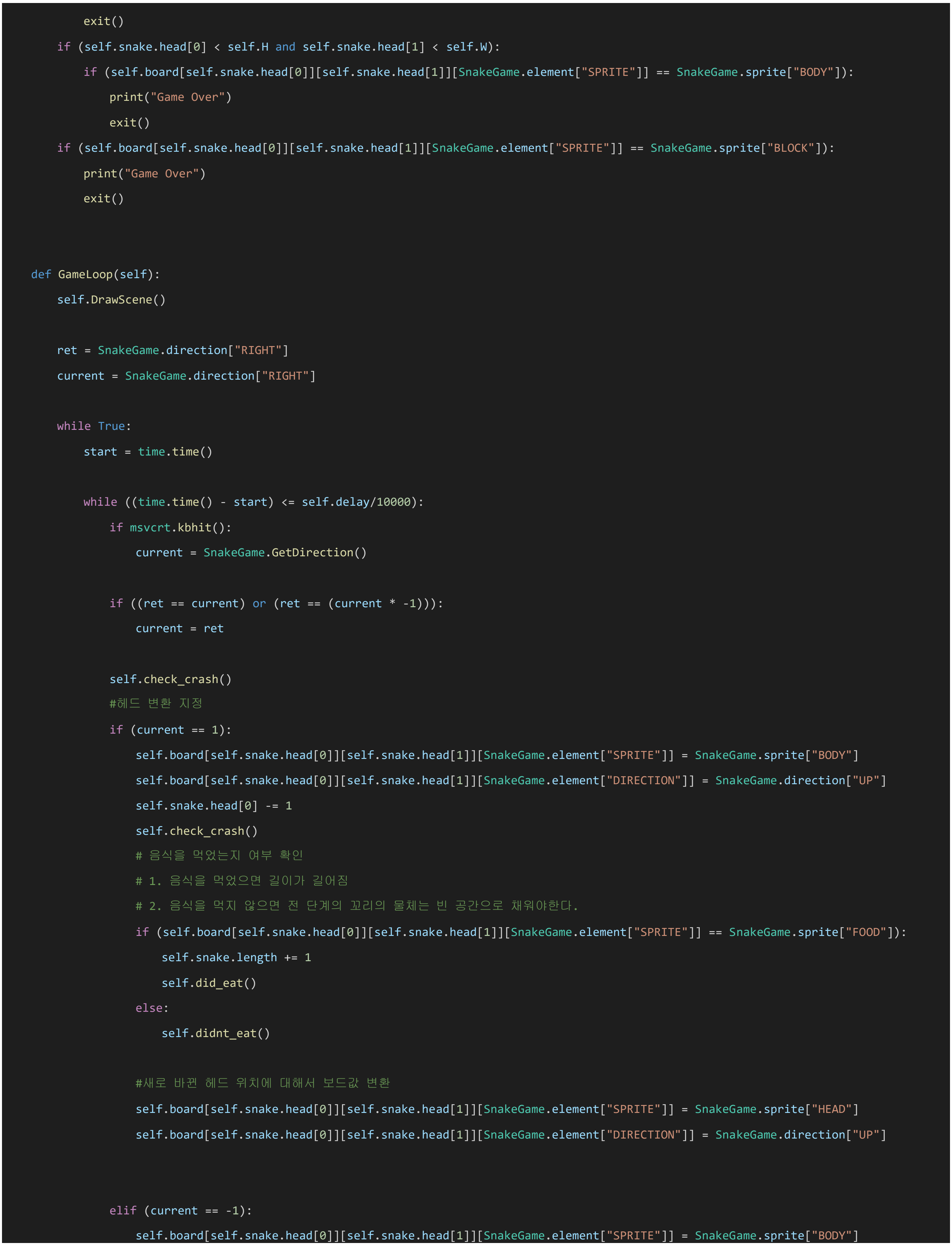
```
# -*- coding: utf8 -*-
from __future__ import print_function
from distutils import extension
import random
import os
import re
from tabnanny import check
import time
import msvcrt

class Snake:
    def __init__(self, n):
        self.length = n
        self.head = []
        self.tail = []

class SnakeGame:
    direction = {"LEFT":-2, "DOWN":-1, "NON_DIR":0, "UP":1, "RIGHT":2}
    sprite = {"EMPTY":0, "BODY":1, "HEAD":2, "FOOD":3, "BLOCK" : 4}
    element = {"SPRITE":0, "DIRECTION":1}

    def __init__(self, w, h, length, delay):
        self.W = w
        self.H = h
        self.initLen = length
        self.snake = Snake(length)
        self.delay = delay
        self.board = [[[0]*2 for x in range(self.W)] for y in range(self.H)]
        #self.board[a][b][c]

        #세로 / 가로
        self.snake.head = [self.H//2, self.snake.length-1]
        self.snake.tail = [self.H//2, 0]

        for i in range(0, self.snake.length):
            self.board[self.H//2][i][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["BODY"]
            self.board[self.H//2][i][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["RIGHT"]

        self.board[self.H//2][self.snake.length-1][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["HEAD"]
        self.board[self.H//2][self.snake.length-1][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["RIGHT"]

        x = random.randint(0, self.W-1)
        y = random.randint(0, self.H-1)

        while self.board[y][x][SnakeGame.element["SPRITE"]] != SnakeGame.sprite["EMPTY"]:
            x = random.randint(0, self.W-1)
            y = random.randint(0, self.H-1)
```



```
        self.board[y][x][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["FOOD"]

        x = random.randint(0, self.W-1)
        y = random.randint(0, self.H-1)

        while self.board[y][x][SnakeGame.element["SPRITE"]] != SnakeGame.sprite["EMPTY"]:
            x = random.randint(0, self.W-1)
            y = random.randint(0, self.H-1)

        self.board[y][x][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["BLOCK"]



    def DrawScene(self):
        os.system('cls||clear')

        for x in range(0, self.W+2):
            print("=", end="")
        print("")

        for y in range(0, self.H):
            print("|", end="")
            for x in range(0, self.W):
                if self.board[y][x][SnakeGame.element["SPRITE"]] == SnakeGame.sprite["BODY"]:
                    print("+", end="")
                elif  self.board[y][x][SnakeGame.element["SPRITE"]] == SnakeGame.sprite["HEAD"]:
                    print("@", end="")
                elif  self.board[y][x][SnakeGame.element["SPRITE"]] == SnakeGame.sprite["FOOD"]:
                    print("*", end="")
                elif  self.board[y][x][SnakeGame.element["SPRITE"]] == SnakeGame.sprite["BLOCK"]:
                    print("N", end="")
                else:
                    print(" ", end="")
            print("|")

        for x in range(0, self.W+2):
            print("=", end="")
        print("")


    @staticmethod
    def GetDirection():
        rtn = SnakeGame.direction["NON_DIR"]
        msvcrt.getch()
        ch = msvcrt.getch().decode()

        if ch == chr(72):
            print("UP")
```



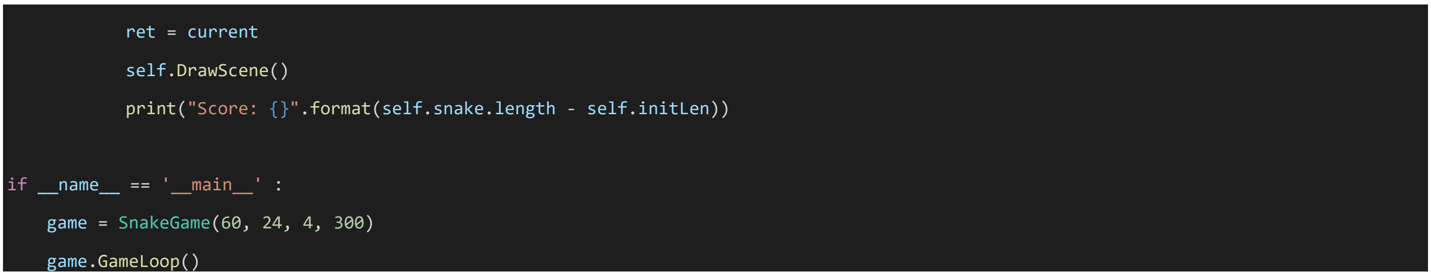
```
            rtn = SnakeGame.direction["UP"]
        elif ch == chr(75):
            print("LEFT")
            rtn = SnakeGame.direction["LEFT"]
        elif ch == chr(77):
            print("RIGHT")
            rtn = SnakeGame.direction["RIGHT"]
        elif ch == chr(80):
            print("DOWN")
            rtn = SnakeGame.direction["DOWN"]
        return rtn

    def did_eat(self):
        x = random.randint(0, self.W-1)
        y = random.randint(0, self.H-1)

        while (self.board[y][x][SnakeGame.element["SPRITE"]] != SnakeGame.sprite["EMPTY"]):
            x = random.randint(0, self.W-1)
            y = random.randint(0, self.H-1)

        self.board[y][x][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["FOOD"]

        x = random.randint(0, self.W-1)
        y = random.randint(0, self.H-1)

        while self.board[y][x][SnakeGame.element["SPRITE"]] != SnakeGame.sprite["EMPTY"]:
            x = random.randint(0, self.W-1)
            y = random.randint(0, self.H-1)

        self.board[y][x][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["BLOCK"]

    def didnt_eat(self):
        self.board[self.snake.tail[0]][self.snake.tail[1]][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["EMPTY"]

        direction = self.board[self.snake.tail[0]][self.snake.tail[1]][SnakeGame.element["DIRECTION"]]
        self.board[self.snake.tail[0]][self.snake.tail[1]][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["NON_DIR"]
        if (direction == 1) :
            self.snake.tail[0] -= 1
        elif (direction == -1) :
            self.snake.tail[0] += 1
        elif (direction == 2) :
            self.snake.tail[1] += 1
        elif (direction == -2) :
            self.snake.tail[1] -= 1


    def check_crash(self):
        if (self.snake.head[0] < 0 or self.snake.head[0] >= self.H or self.snake.head[1] < 0 or self.snake.head[1] >= self.W):
            print("Game Over")
```



```
            exit()
        if (self.snake.head[0] < self.H and self.snake.head[1] < self.W):
            if (self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] == SnakeGame.sprite["BODY"]):
                print("Game Over")
                exit()
        if (self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] == SnakeGame.sprite["BLOCK"]):
            print("Game Over")
            exit()


    def GameLoop(self):
        self.DrawScene()

        ret = SnakeGame.direction["RIGHT"]
        current = SnakeGame.direction["RIGHT"]

        while True:
            start = time.time()

            while ((time.time() - start) <= self.delay/10000):
                if msvcrt.kbhit():
                    current = SnakeGame.GetDirection()

                if ((ret == current) or (ret == (current * -1))):
                    current = ret

                self.check_crash()
                #헤드 변환 지정
                if (current == 1):
                    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["BODY"]
                    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["UP"]
                    self.snake.head[0] -= 1
                    self.check_crash()
                    # 음식을 먹었는지 여부 확인
                    # 1. 음식을 먹었으면 길이가 길어짐
                    # 2. 음식을 먹지 않으면 전 단계의 꼬리의 물체는 빈 공간으로 채워야한다.
                    if (self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] == SnakeGame.sprite["FOOD"]):
                        self.snake.length += 1
                        self.did_eat()
                    else:
                        self.didnt_eat()

                    #새로 바뀐 헤드 위치에 대해서 보드값 변환
                    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["HEAD"]
                    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["UP"]



                elif (current == -1):
                    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["BODY"]
                    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["DOWN"]
                    self.snake.head[0] += 1
                    self.check_crash()

                    if (self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] == SnakeGame.sprite["FOOD"]):
                        self.snake.length += 1
                        self.did_eat()
                    else:
                        self.didnt_eat()

                    #새로 바뀐 헤드 위치에 대해서 보드값 변환
                    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["DOWN"]
                    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["HEAD"]


                elif (current == 2):
                    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["BODY"]
                    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["RIGHT"]
                    self.snake.head[1] += 1
                    self.check_crash()

                    if (self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] == SnakeGame.sprite["FOOD"]):
                        self.snake.length += 1
                        self.did_eat()
                    else:
                        self.didnt_eat()

                    #새로 바뀐 헤드 위치에 대해서 보드값 변환
                    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["RIGHT"]
                    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["HEAD"]


                elif (current == -2):
                    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["BODY"]
                    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["LEFT"]
                    self.snake.head[1] -= 1
                    self.check_crash()

                    if (self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] == SnakeGame.sprite["FOOD"]):
                        self.snake.length += 1
                        self.did_eat()
                    else:
                        self.didnt_eat()

                    #새로 바뀐 헤드 위치에 대해서 보드값 변환
                    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["DIRECTION"]] = SnakeGame.direction["LEFT"]
                    self.board[self.snake.head[0]][self.snake.head[1]][SnakeGame.element["SPRITE"]] = SnakeGame.sprite["HEAD"]
                time.sleep(0.1)
```

2022 년 2 학기 게임 프로그래밍 입문 (실습 1)

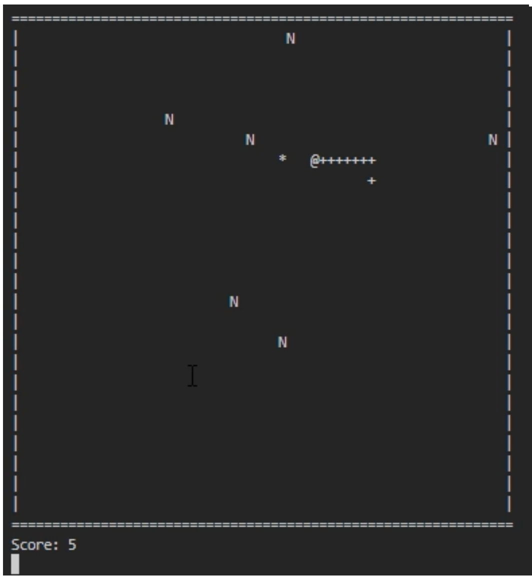
이름: 정은성 학과: 원자력공학과 학번: 2021103751



```
            ret = current
            self.DrawScene()
            print("Score: {}".format(self.snake.length - self.initLen))

if __name__ == '__main__' :
    game = SnakeGame(60, 24, 4, 300)
    game.GameLoop()
```

기본 코드와 다른 것이 거의 없지만, 랜덤 함수에 의해서 음식과 같이 음식이 사라졌을 때 블록을 생성하고 충돌 조건을 두어 만듦

게임 플레이 :



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Score: 5
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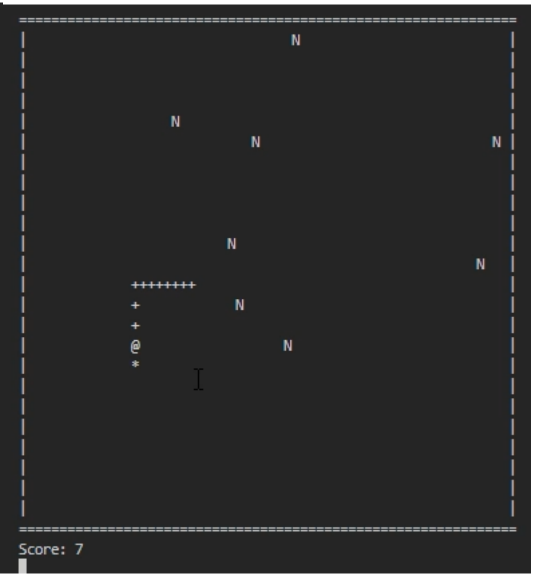

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Score: 7
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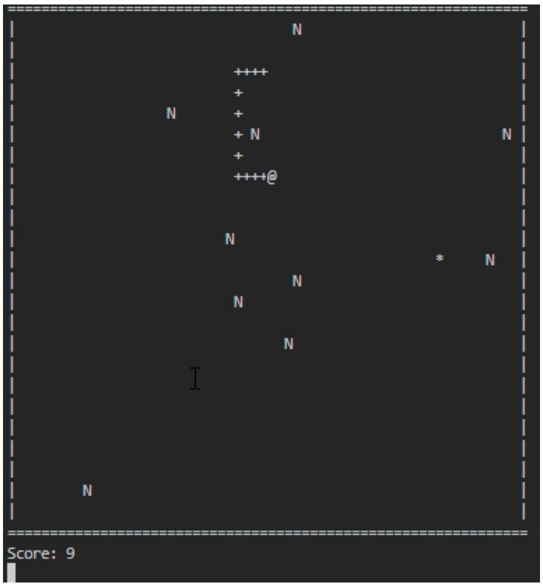

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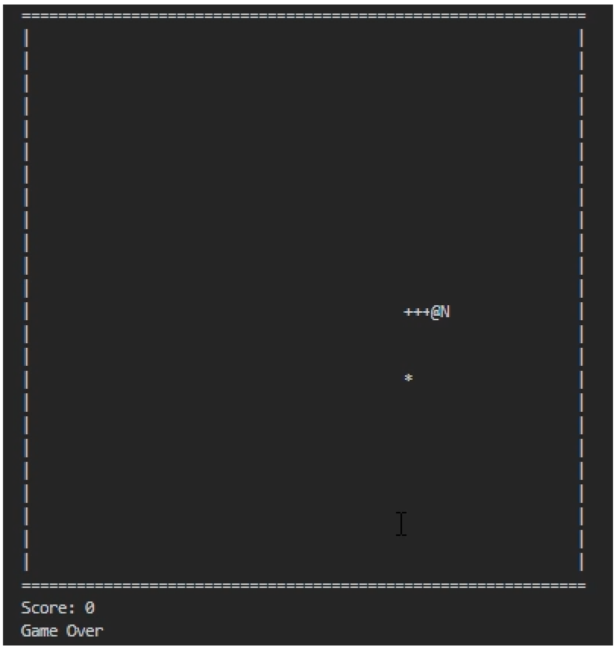
|        N                                                 |
|                                                          |
|                                                          |
============================================================
Score: 9
```

2022 년 2 학기 게임 프로그래밍 입문 (실습 1)

이름: 정은성 학과: 원자력공학과 학번: 2021103751



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Score: 0
Game Over
```