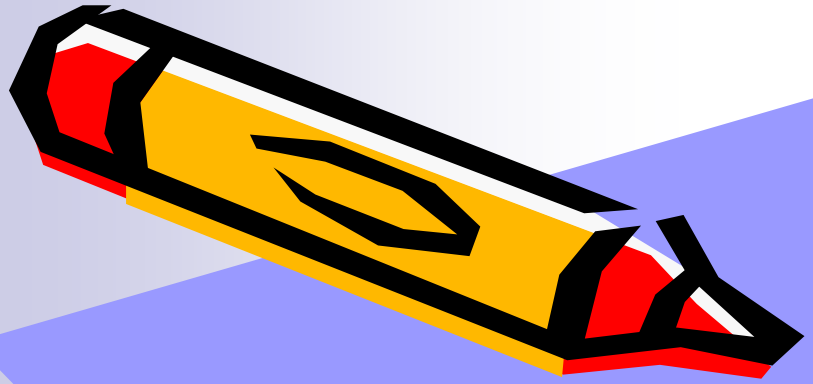

2D 게임 프로그래밍

제10강 맵 스크롤링

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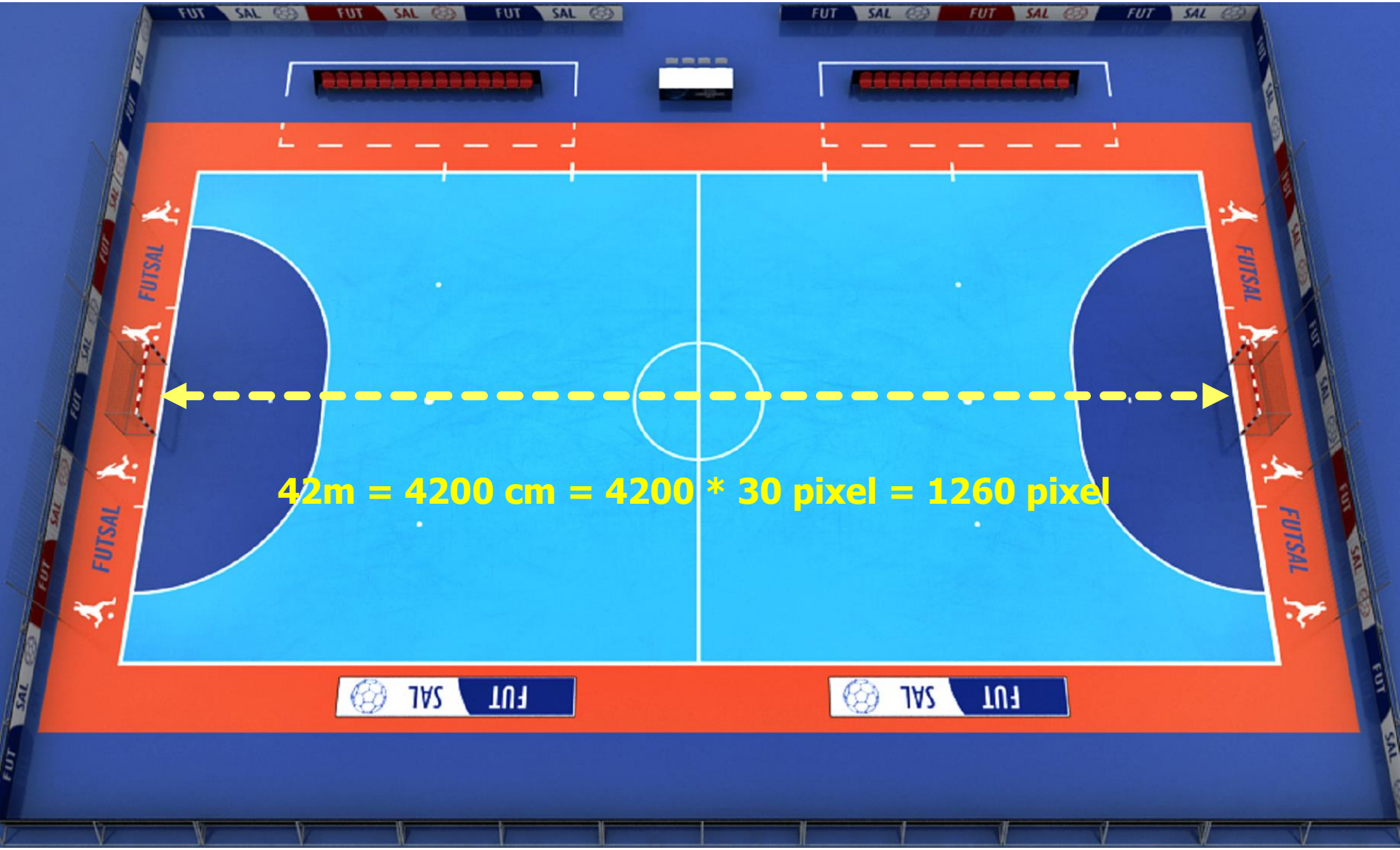
한국산업기술대학교

학습 내용

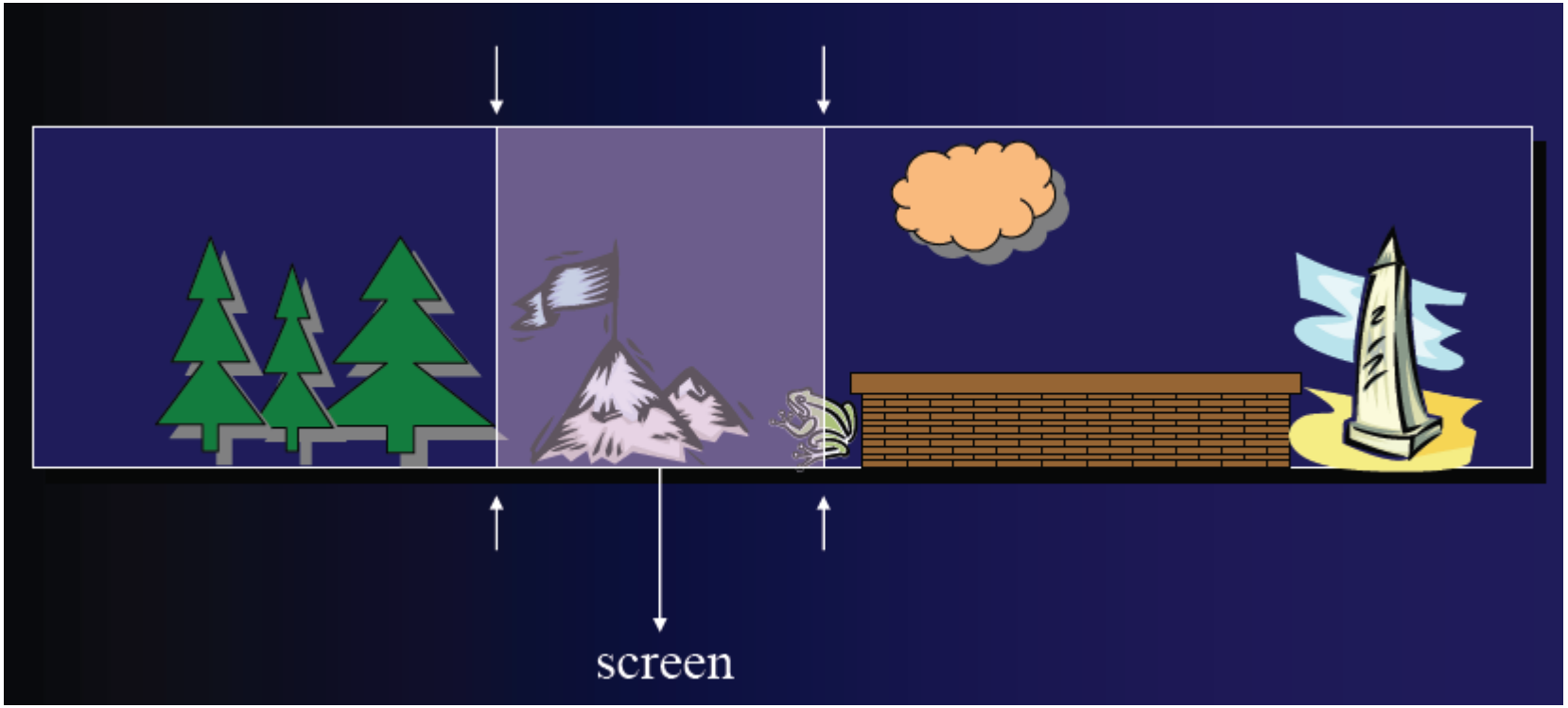
- 게임 맵
- 스크롤링
- 무한 스크롤링
- 시차 스크롤링

게임 맵은 반드시 실제 물리값으로 크기가 표시되어야 함.



스크롤링(Scrolling)

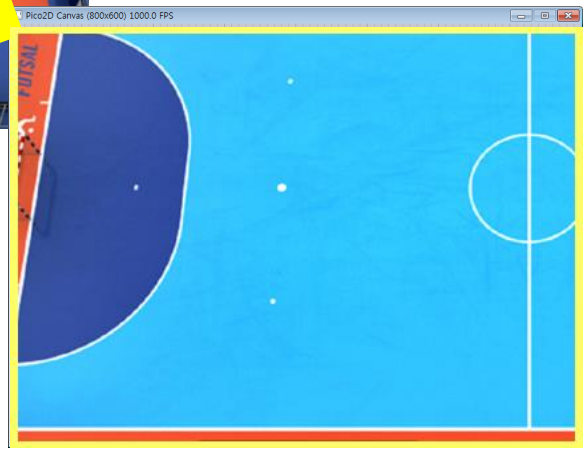
- 그림이나 이미지의 일부분을 디스플레이 화면 위에서 상하좌우로 움직이면서 나타내는 기법.
- 슈팅 게임, 고전 RPG 게임에서 주로 사용됨.



카메라 윈도우를 이용한 스크롤링

(x-canvas_width//2, y-canvas_height//2)

clip_draw_to_origin



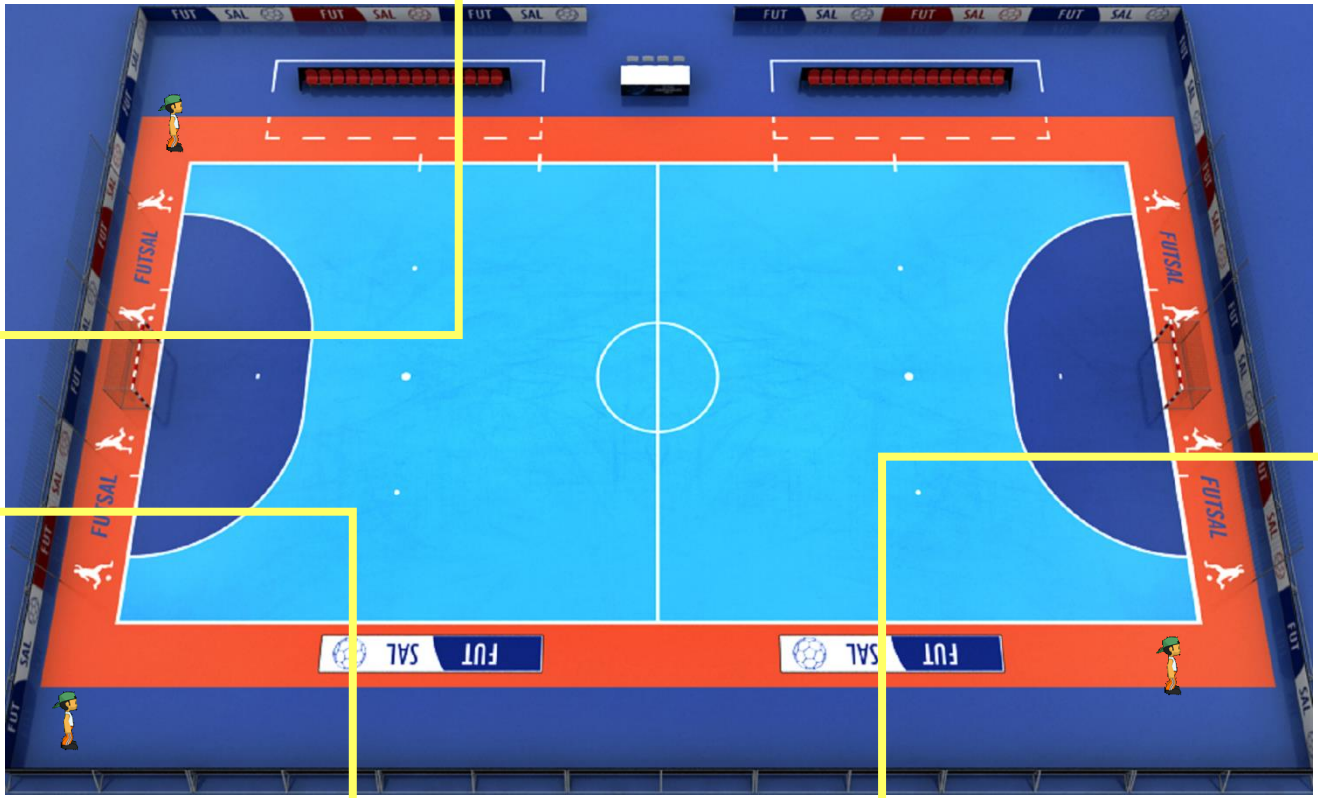
#3. 윈도우 영역을 클리핑하여, 캔버스에 그림.

Clip_draw_to_origin : 피봇 맨왼쪽 맨아래쪽 기준

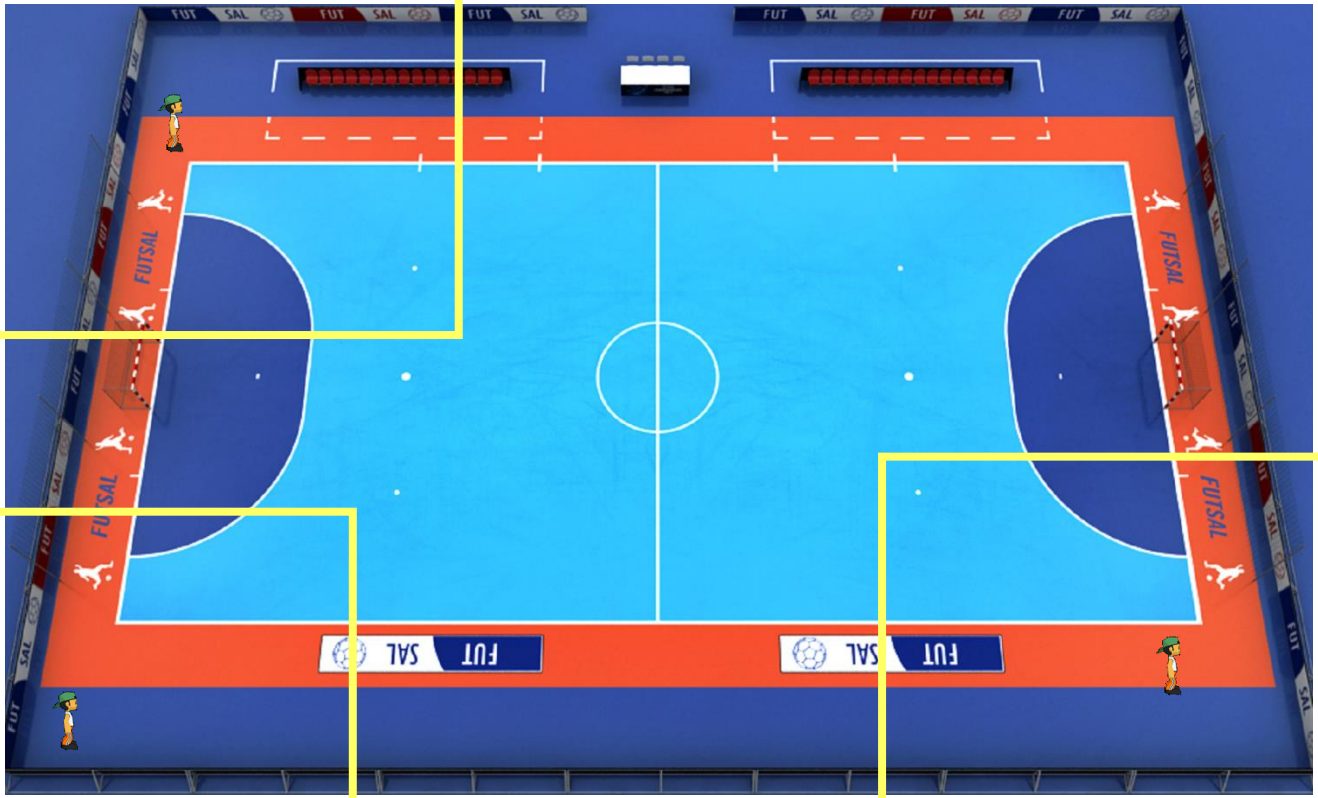
#4. 플레이어를 캔버스에 그림.

(canvas_width//2, canvas_height//2)

벗어날 경우?



벗어날 경우?



실습

상하좌우 스크롤링

clamp 함수

```
def clamp(minimum, x, maximum):
    return max(minimum, min(x, maximum))
```

scroll_state.py

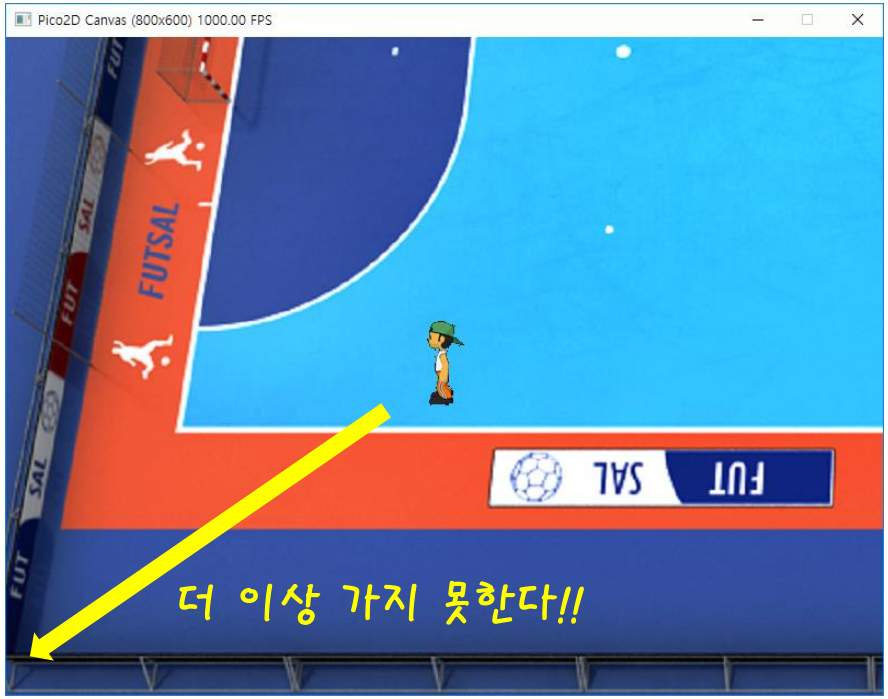

```
def create_world():
    global boy, background
    boy = Boy()
    background = Background()

    background.set_center_object(boy)
    boy.set_background(background)
```

background.py

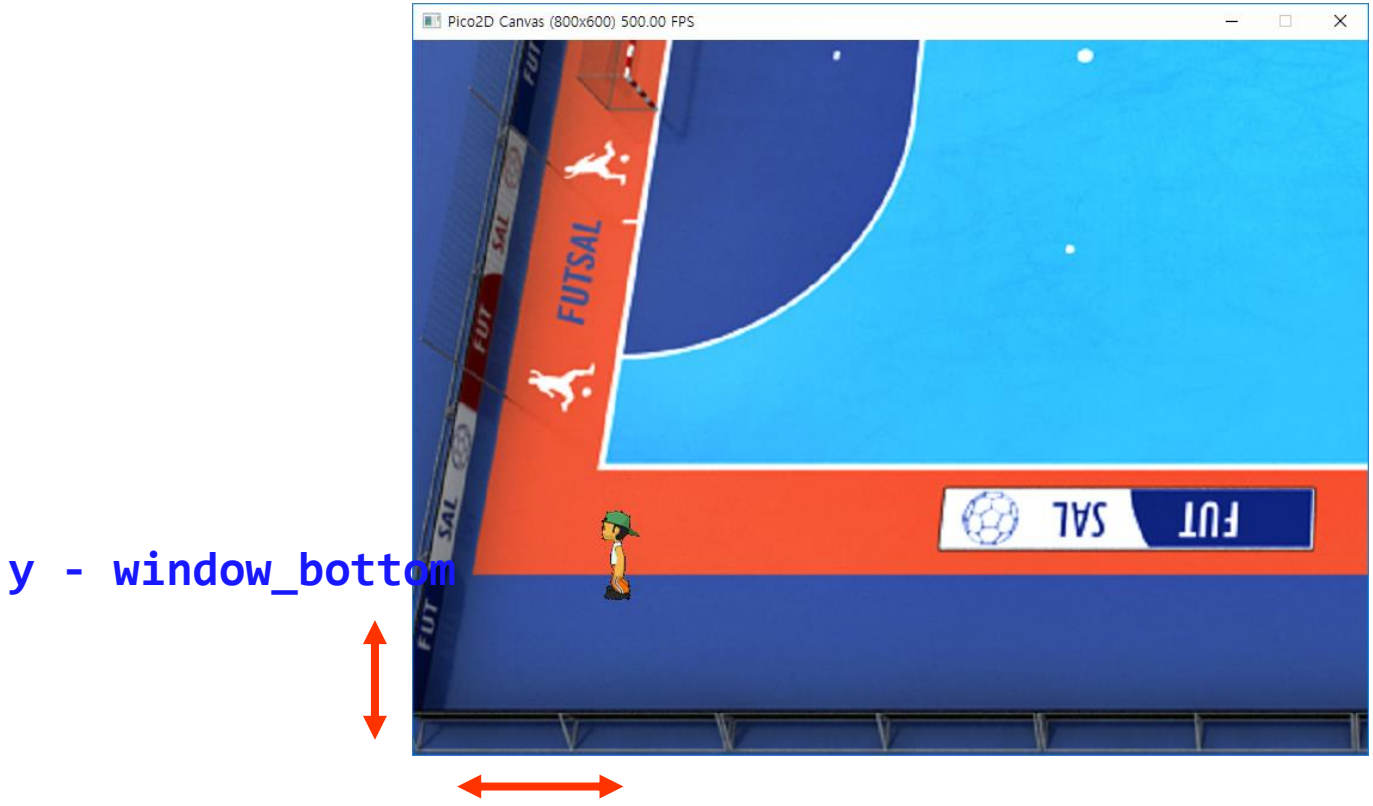

```
def set_center_object(self, boy):
    self.center_object = boy


def draw(self):
    self.image.clip_draw_to_origin(
        self.window_left, self.window_bottom,
        self.canvas_width, self.canvas_height,
        0, 0)


def update(self, frame_time):
    self.window_left = clamp(0,
        int(self.center_object.x) - self.canvas_width//2,
        self.w - self.canvas_width)
    self.window_bottom = clamp(0,
        int(self.center_object.y) - self.canvas_height//2,
        self.h - self.canvas_height)
```

boy.py


```
def update(self, frame_time):
    self.life_time += frame_time
    distance = FreeBoy.RUN_SPEED_PPS * frame_time
    self.total_frames +=
        FreeBoy.FRAMES_PER_ACTION * FreeBoy.ACTION_PER_TIME * frame_time
    self.frame = int(self.total_frames) % 8
    self.x += (self.xdir * distance)
    self.y += (self.ydir * distance)

    self.x = clamp(self.canvas_width//2,
                   self.x,
                   self.bg.w-self.canvas_width//2)

    self.y = clamp(self.canvas_height//2,
                   self.y,
                   self.bg.h - self.canvas_height//2)


def draw(self):
    self.image.clip_draw(self.frame * 100, self.state * 100, 100, 100,
                         self.canvas_width//2,
                         self.canvas_height//2)
```



플레이어의 화면상의 좌표 계산



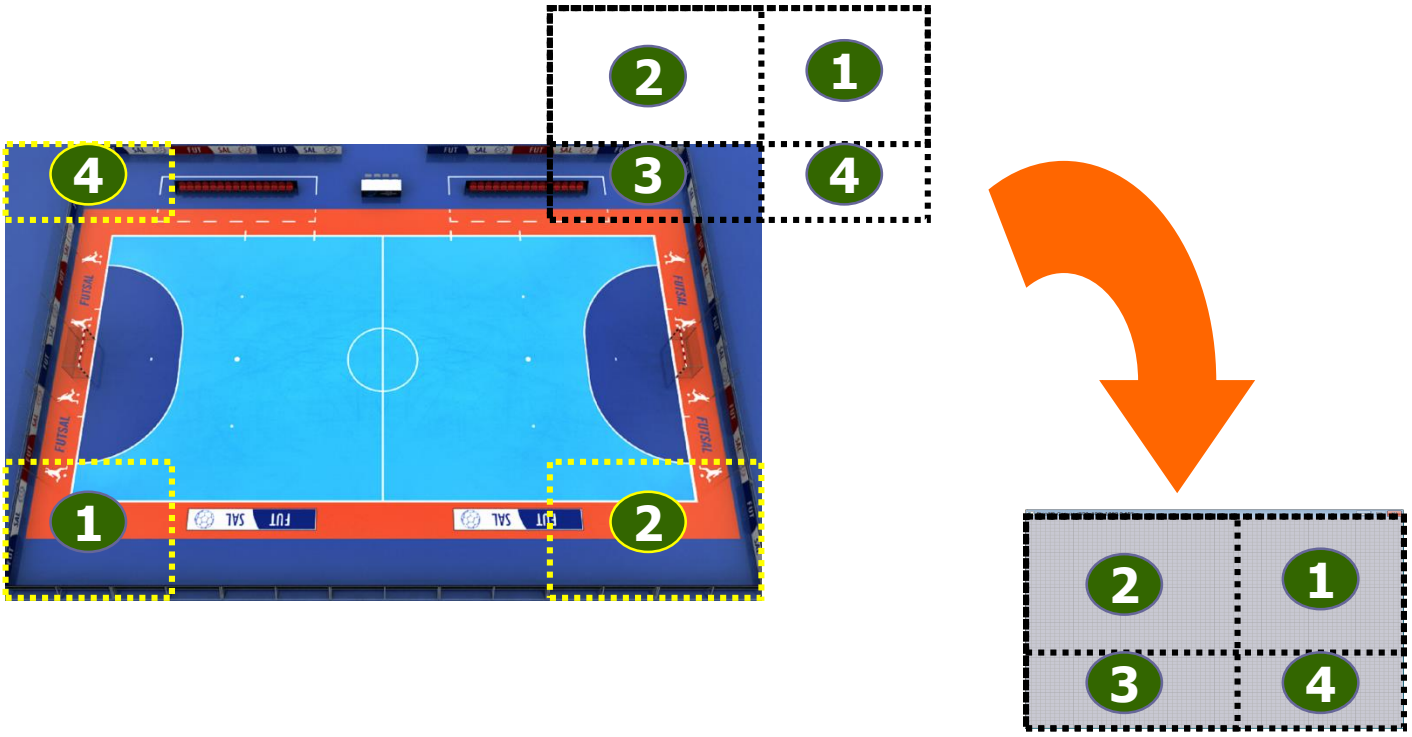
boy.py

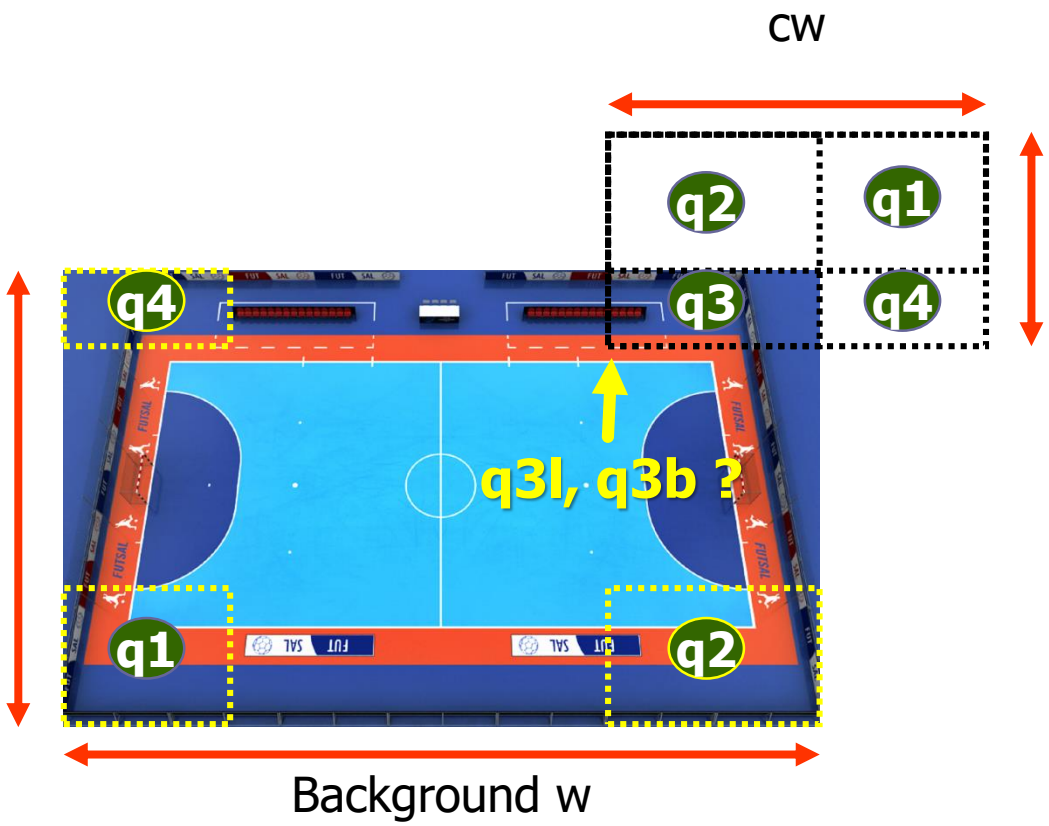

```
def update(self, frame_time):
    self.life_time += frame_time
    distance = FreeBoy.RUN_SPEED_PPS * frame_time
    self.total_frames +=
        FreeBoy.FRAMES_PER_ACTION * FreeBoy.ACTION_PER_TIME * frame_time
    self.frame = int(self.total_frames) % 8
    self.x += (self.xdir * distance)
    self.y += (self.ydir * distance)

    self.x = clamp(0, self.x, self.bg.w)
    self.y = clamp(0, self.y, self.bg.h)


def draw(self):
    self.image.clip_draw(self.frame * 100, self.state * 100, 100, 100,
                         self.x - self.bg.window_left,
                         self.y - self.bg.window_bottom)
```

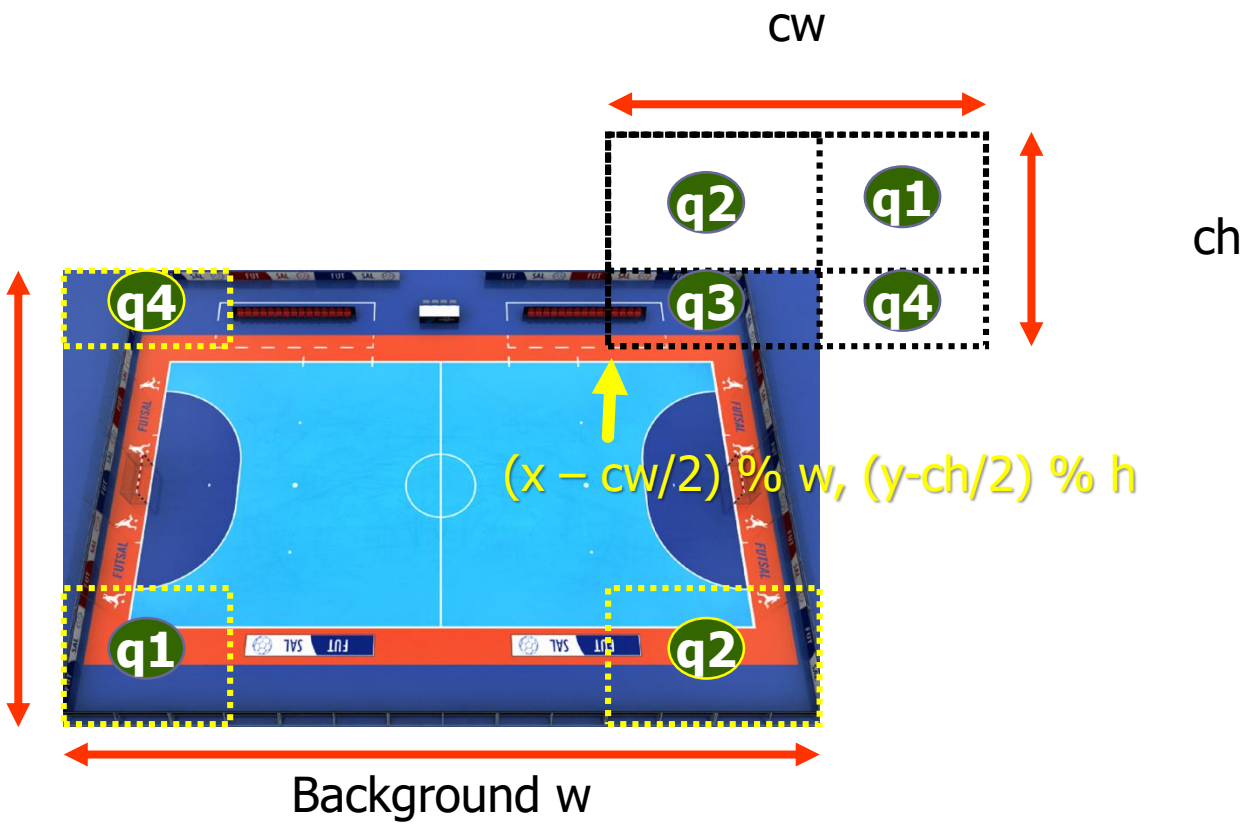
실습

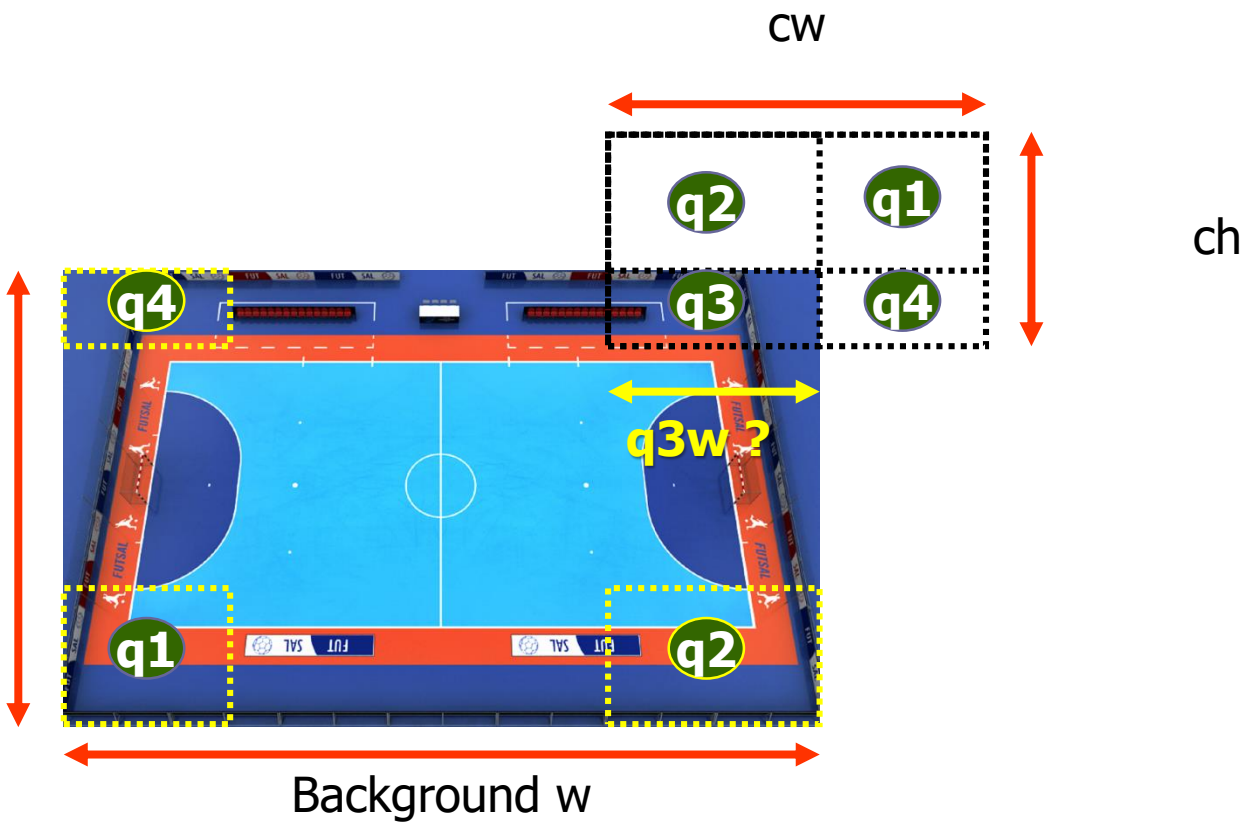
상하좌우 무한 스크롤링

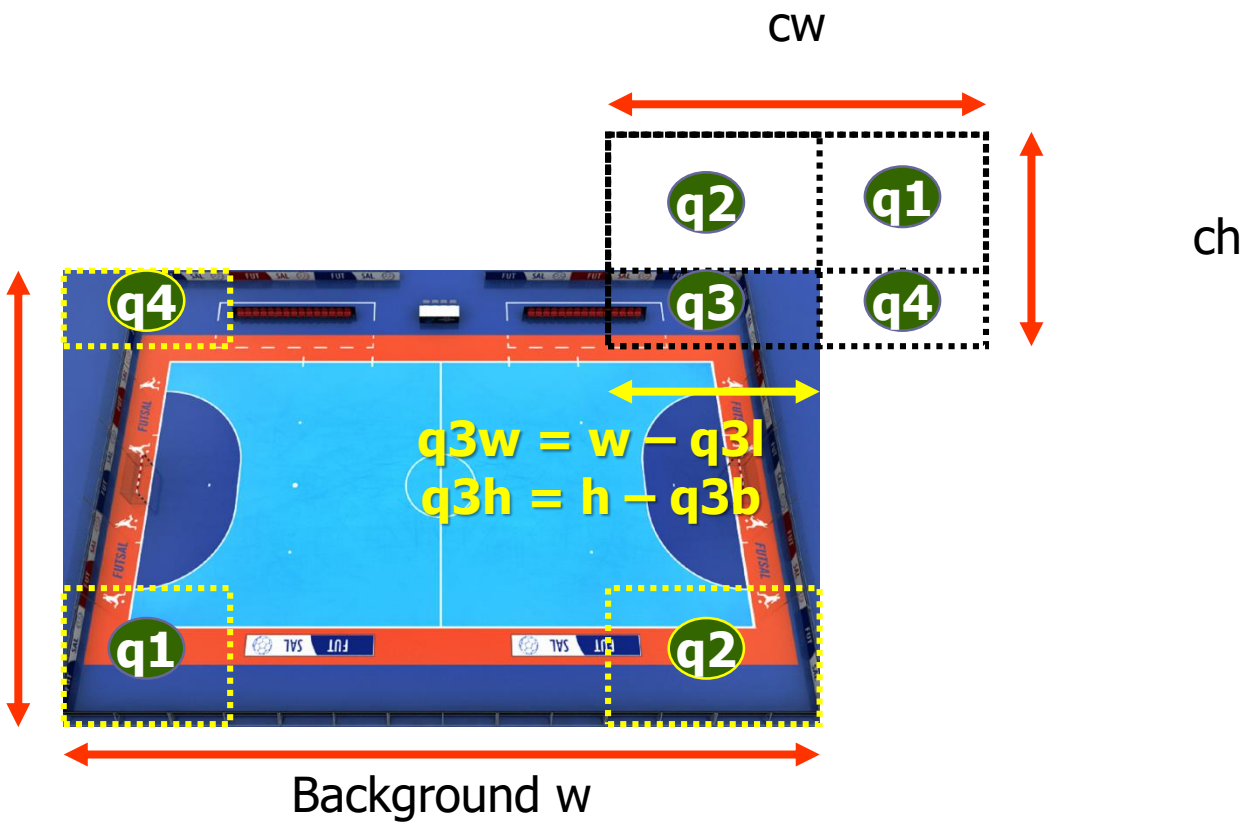
상하좌우 무한스크롤링 공식







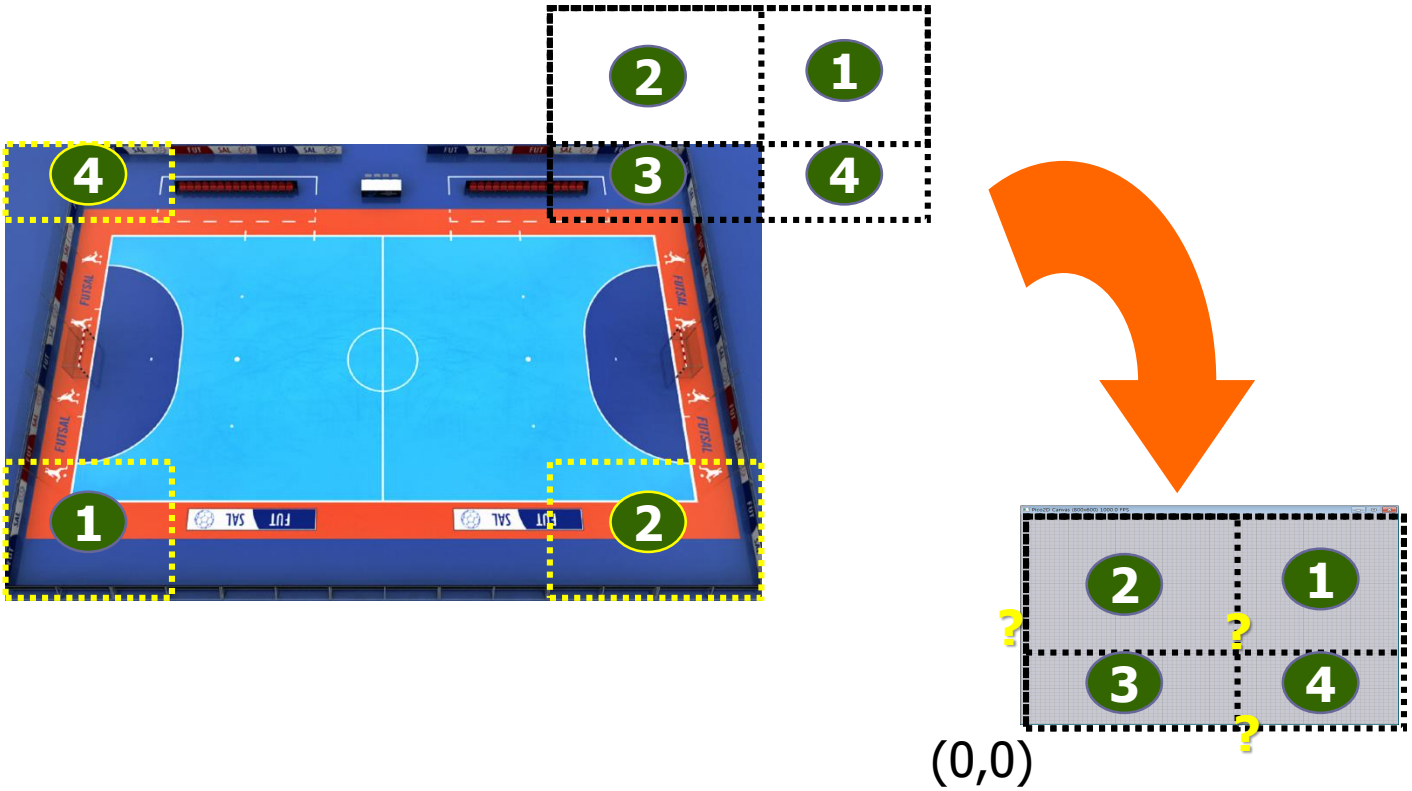




background.py


```
class InfiniteBackground:

    def update(self, frame_time):
        #     quadrant 3
        self.q3l = (int(self.center_object.x) - self.canvas_width // 2) % self.w
        self.q3b = (int(self.center_object.y) - self.canvas_height // 2) % self.h
        self.q3w = clamp(0, self.w - self.q3l, self.w)
        self.q3h = clamp(0, self.h - self.q3b, self.h)

        #     quadrant 2
        self.q2l = ?
        self.q2b = ?
        self.q2w = ?
        self.q2h = ?

        #     quadrant 4
        self.q4l = ?
        self.q4b = ?
        self.q4w = ?
        self.q4h = ?

        #     quadrant 1
        self.q1l = ?
        self.q1b = ?
        self.q1w = ?
        self.q1h = ?
```

상하좌우 무한스크롤링 공식



background.py

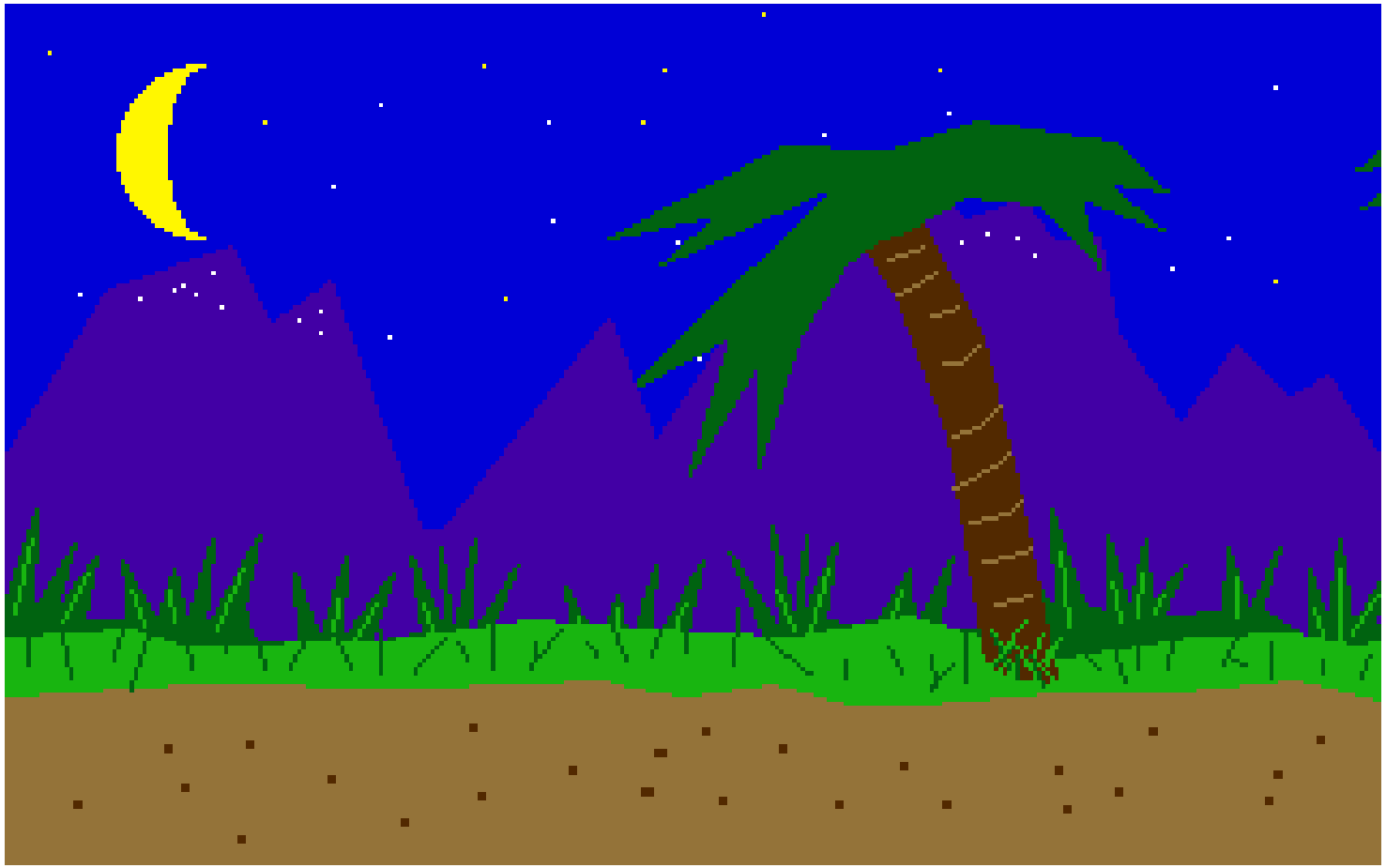

```
class InfiniteBackground:

    def draw(self):
        self.image.clip_draw_to_origin(self.q3l, self.q3b, self.q3w, self.q3h, 0, 0)
        self.image.clip_draw_to_origin(self.q2l, self.q2b, self.q2w, self.q2h, ?, ?)
        self.image.clip_draw_to_origin(self.q4l, self.q4b, self.q4w, self.q4h, ?, ?)
        self.image.clip_draw_to_origin(self.q1l, self.q1b, self.q1w, self.q1h, ?, ?)
```

시차(視差) 스크롤링(Parallax Scrolling)

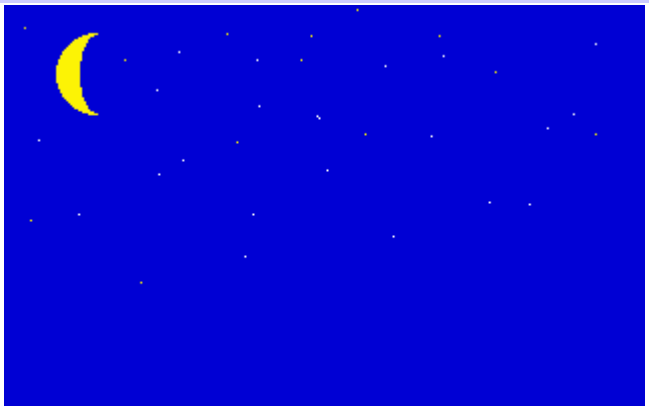
- 물체와 눈의 거리에 따라, 물체의 이동속도가 달라보이는 효과를 이용하여, 3차원 배경을 흉내내는 기법.

- 1982년 “Moon Patrol”이라는 게임에서 세계 최초로 사용됨.

• 밤하늘, 뒷산, 앞산의 스크롤링 속도를 다르게 함으로써, 3차원적인 깊이 효과를 구현.



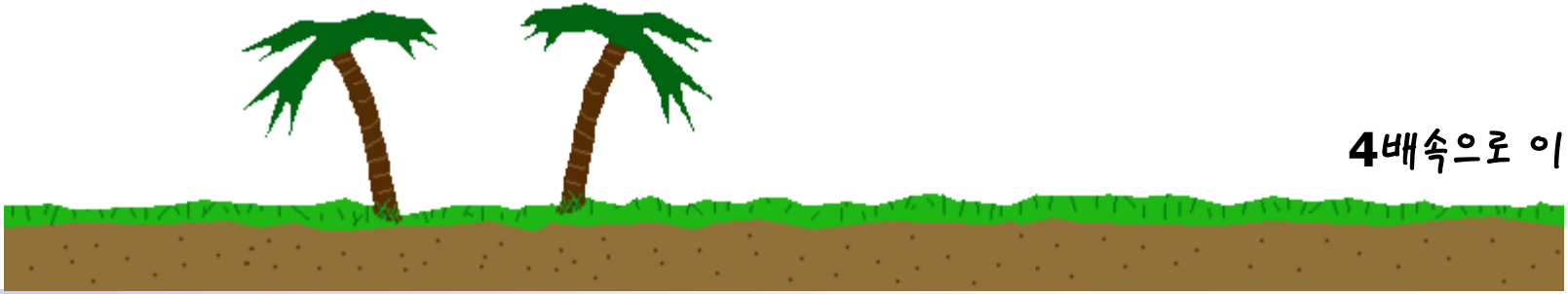
시차 스크롤링 방법



1배속으로 이동

2배속으로 이동

3배속으로 이동



4배속으로 이동

정답

```
def draw(self):
    # fill here
    self.image.clip_draw_to_origin(self.q3l, self.q3b, self.q3w, self.q3h, 0, 0)                    # quadrant 3
    self.image.clip_draw_to_origin(self.q2l, self.q2b, self.q2w, self.q2h, 0, self.q3h)             # quadrant 2
    self.image.clip_draw_to_origin(self.q4l, self.q4b, self.q4w, self.q4h, self.q3w, 0)             # quadrant 4
    self.image.clip_draw_to_origin(self.q1l, self.q1b, self.q1w, self.q1h, self.q3w, self.q3h)      # quadrant 1


def update(self, frame_time):

    # quadrant 3
    self.q3l = (int(self.center_object.x) - self.canvas_width // 2) % self.w
    self.q3b = (int(self.center_object.y) - self.canvas_height // 2) % self.h
    self.q3w = clamp(0, self.w - self.q3l, self.w)
    self.q3h = clamp(0, self.h - self.q3b, self.h)


    # quadrant 2
    self.q2l = self.q3l
    self.q2b = 0
    self.q2w = self.q3w
    self.q2h = self.canvas_height - self.q3h


    # quadrand 4
    self.q4l = 0
    self.q4b = self.q3b
    self.q4w = self.canvas_width - self.q3w
    self.q4h = self.q3h


    # quadrand 1
    self.q1l = 0
    self.q1b = 0
    self.q1w = self.q4w
    self.q1h = self.q2h
```