"DS/AI 프로그래밍"

6주차 PyGame 기초1 (도형, 이미지, 문자)

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1) PyGame 설치: 관리자 권한으로 CMD 실행

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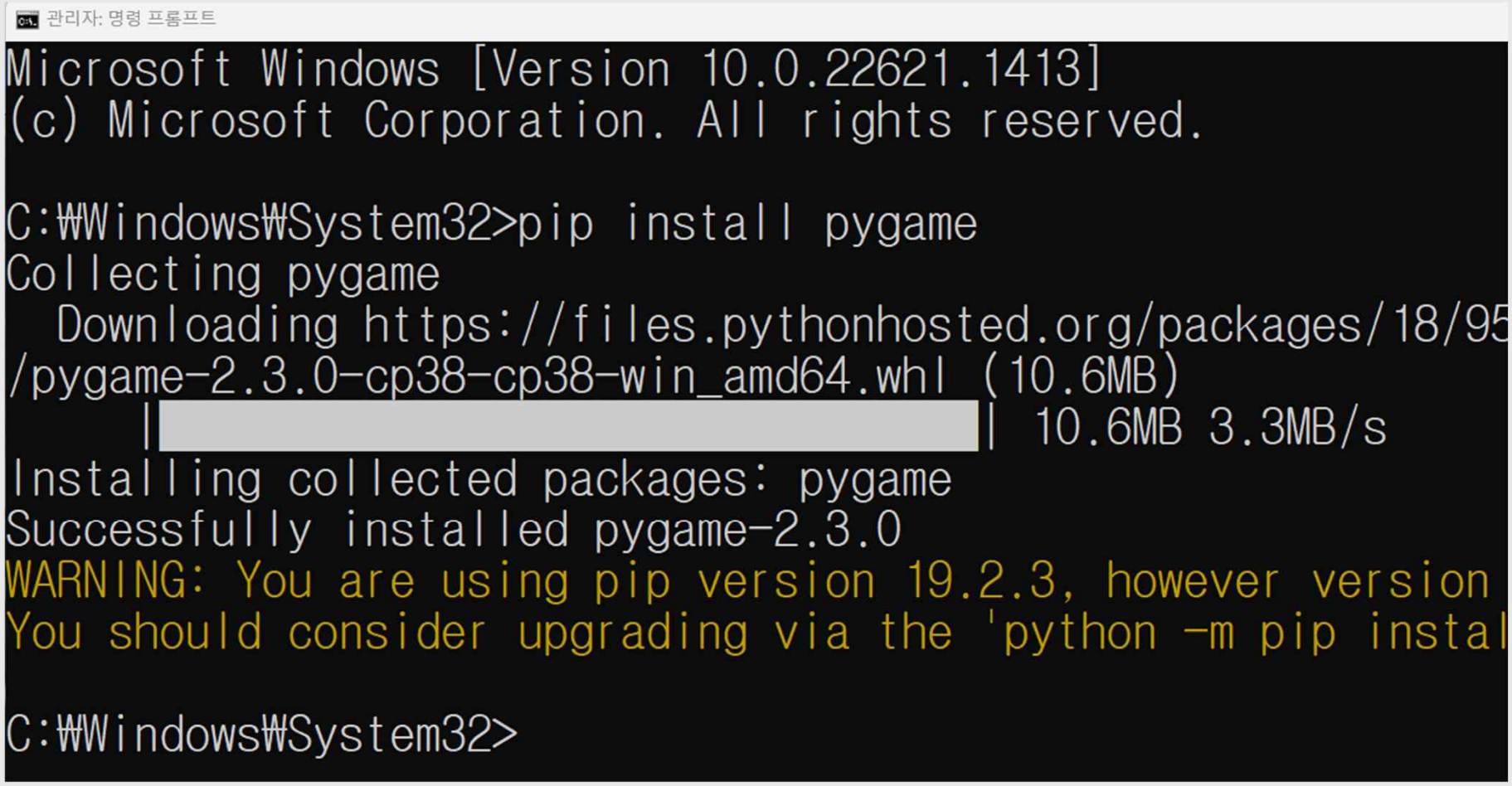

2) IDLE을 열고, justwindows.py 를 실행:
메뉴바에서 “Open” -> “Run Module”

justwindow.py - C:\Users\사용자\OneDrive\문서\데이터과학원\데이터과학원 강의 IDS-2023\2023년도 1학기 데이터과학원 실습용\DSAI 프로그래밍\문제\samples\

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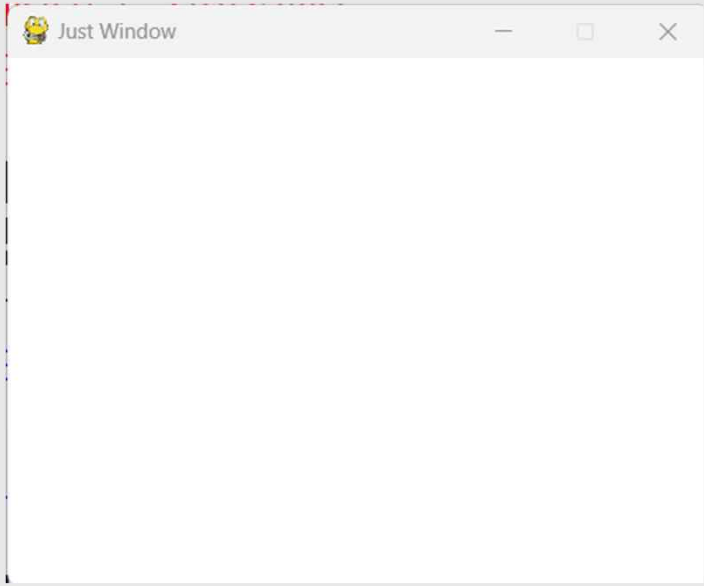
```
""" justwindow.py """
import sys
import pygame
from pygame.locals import QUIT

pygame.init()
SURFACE = pygame.display.set_mode((400, 300))
pygame.display.set_caption("Just Window")

def main():
    """ main routine """
    while True:
        SURFACE.fill((255, 255, 255))

        for event in pygame.event.get():
            if event.type == QUIT:
                pygame.quit()
                sys.exit()

        pygame.display.update()
```

※ sys module –
Access system-specific parameters and functions.



justwindow.py - C:\Users\사용자\OneDrive\문서\데이터과학원\데이터과학원 강의 ID3-\2023 고려대학교 데이터과학원 온라인강의\D3AI 프로그래밍\표제\samples\

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```
""" justwindow.py """
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SURFACE = pygame.display.set_mode((400, 300))
pygame.display.set_caption("Just Window")

def main():
    """ main routine """
    while True:
        SURFACE.fill((255, 255, 255))

        for event in pygame.event.get():
            if event.type == QUIT:
                pygame.quit()
                sys.exit()

        pygame.display.update()
```

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윈도우 닫기 버튼 누를때

PyGame 초기화 해제

프로그램 종료

색깔

(0,0,0)	검정색
(255,255,255)	흰색
(255,0,0)	빨간색
(0,255,0)	녹색
(0,0,255)	파란색
(255,255,0)	노란색

Q) 색을 바꿔서 어떻게 색이 변하는지 확인

fps

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```
""" fps_test1.py """
import sys
import pygame
from pygame.locals import QUIT

pygame.init()
SURFACE = pygame.display.set_mode((400, 300))

def main():
    """ main routine """
    sysfont = pygame.font.SysFont(None, 36)
    counter = 0
    while True:
        for event in pygame.event.get():
            if event.type == QUIT:
                pygame.quit()
                sys.exit()
```

```
def main():
    """ main routine """
    sysfont = pygame.font.SysFont(None, 36)
    counter = 0
    while True:
        for event in pygame.event.get():
            if event.type == QUIT:
                pygame.quit()
                sys.exit()

        counter += 1
        SURFACE.fill((0, 0, 0))
        count_image = sysfont.render("count is {}".format(counter), True, (225, 225, 225))
        SURFACE.blit(count_image, (50, 50))
        pygame.display.update()
```

fps 조정

fps_test2.py - C:\Users\서정권\OneDrive\문서\데이터과학원\데이터과학원 강의 IDS-\2023년도 1학기 대학원 일반공통\DSAI 스노그래밍\교재\

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```
""" fps_test2.py """
import sys
import pygame
from pygame.locals import QUIT

pygame.init()
SURFACE = pygame.display.set_mode((400, 300))
FPSCLOCK = pygame.time.Clock()

def main():
    """ main routine """
    sysfont = pygame.font.SysFont(None, 36)
    counter = 0
    while True:
        for event in pygame.event.get():
            if event.type == QUIT:
                pygame.quit()
```

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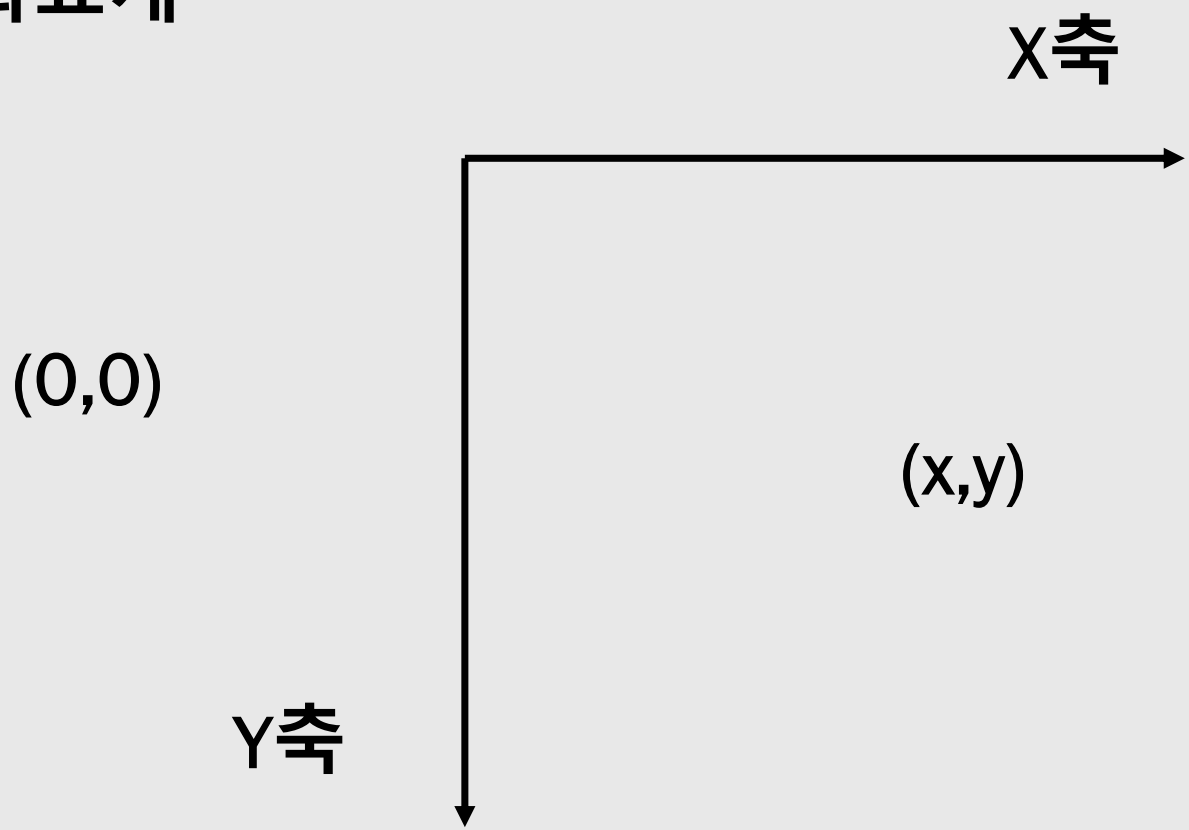
```
def main():
    """ main routine """
    sysfont = pygame.font.SysFont(None, 36)
    counter = 0
    while True:
        for event in pygame.event.get():
            if event.type == QUIT:
                pygame.quit()
                sys.exit()

        counter += 1
        SURFACE.fill((0, 0, 0))
        count_image = sysfont.render("count is {}".format(counter), True, (225, 225, 225))
        SURFACE.blit(count_image, (50, 50))
        pygame.display.update()
        FPSCLOCK.tick(10)
```

PC 좌표계



Rect 클래스

Rect(left, top, width, height)
Rect((left, top), (width, height))

property

x, y, top, left, bottom, right

topleft, bottomleft, topright, bottomright

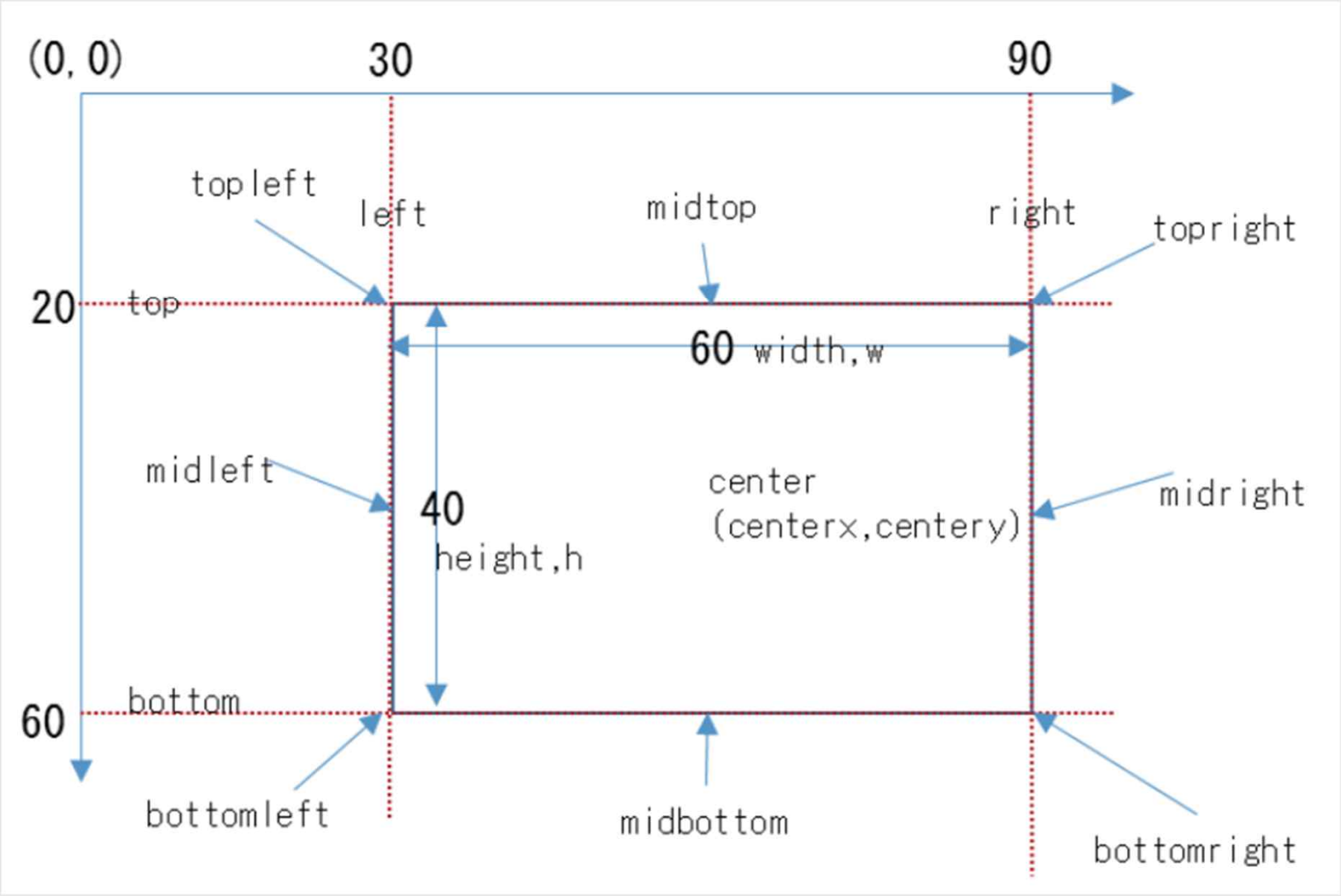
midtop, midleft, midbottom, midright

center, centerx, centery

size, width, height,w, h

```
>>> r = Rect(30, 20, 60, 40)
>>> r.center
(60, 40)
>>> r.bottomleft
(30, 60)
>>> r.width
60
>>> r.bottom
60
```

Q) 여러가지 property 연습



Rect 클래스의 주요 메서드를 다음에 나열합니다.

copy()	Rect 객체를 복제한다
move(x, y)	(x, y) 이동한 Rect를 반환한다. 자신은 이동하지 않는다
move_ip(x, y)	자신(Rect)을 (x, y) 이동한다
inflate(x, y)	현재값에서 (x, y)만큼 크기를 변경한 Rect를 반환한다
inflate_ip(x, y)	자신의 사이즈를 (x, y)만큼 변경한다
union(Rect)	자신과 인수의 Rect를 포함하는 최소 Rect를 반환한다
contains(Rect)	인수의 Rect를 포함하는지 아닌지 여부를 반환한다
collidepoint(x, y)	(x, y)라는 점이 자신에게 포함되는지 아닌지 여부를 반환한다
colliderect(Rect)	Rect와 자신에게 겹침이 있는지 없는지(충돌)를 반환한다

```
>>> r = Rect(10, 20, 30, 40)
>>> r.move(50, 60)
<rect(60, 80, 30, 40)>
>>> r
<rect(10, 20, 30, 40)>
>>> r.move_ip(50, 60)
>>> r
<rect(60, 80, 30, 40)>
```

rect 그리기

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rect(Surface, color, Rect, width=0) -> Rect

Surface: 그리는 대상이 되는 화면 (Surface 객체)

color: 색

Rect: 직사각형의 위치와 크기

width: 선 폭 (생략할 때는 빈틈없이 칠한다)

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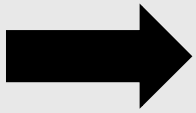
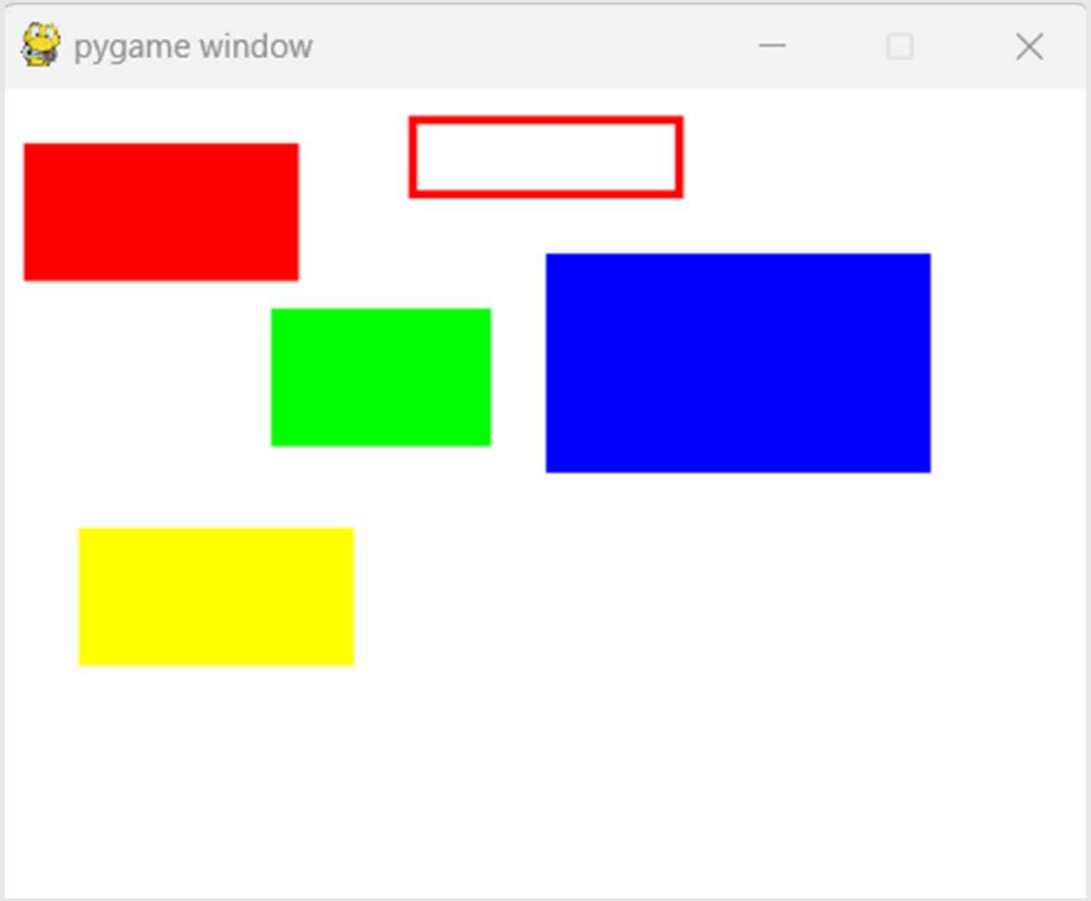
```
""" draw_rect1.py """
import sys
import pygame
from pygame.locals import QUIT, Rect

pygame.init()
SURFACE = pygame.display.set_mode((400, 300))
FPSCLOCK = pygame.time.Clock()

def main():
    """ main routine """

    while True:
        for event in pygame.event.get():
            if event.type == QUIT:
                pygame.quit()
                sys.exit()
```

```
SURFACE.fill((255, 255, 255))

# 빨간색: 직사각형 (빈틈없이 칠한다)
pygame.draw.rect(SURFACE, (255, 0, 0), (10, 20, 100, 50))

# 빨간색: 직사각형 (굵기 3)
pygame.draw.rect(SURFACE, (255, 0, 0), (150, 10, 100, 30), 3)

# 녹색: 직사각형
pygame.draw.rect(SURFACE, (0, 255, 0), ((100, 80), (80, 50)))

# 파란색: 직사각형, Rect 오브젝트
rect0 = Rect(200, 60, 140, 80)
pygame.draw.rect(SURFACE, (0, 0, 255), rect0)

# 노란색: 직사각형, Rect 오브젝트
rect1 = Rect((30, 160), (100, 50))
pygame.draw.rect(SURFACE, (255, 255, 0), rect1)
```




pygame window

circle 그리기

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circle(Surface, color, pos, radius, width=0) -> Rect

Surface: 그리는 대상이 되는 화면(Surface 객체)

color: 색

pos: 중심 좌표

radius: 반경

width: 선 폭(생략 시는 꽉 채워 칠한다)

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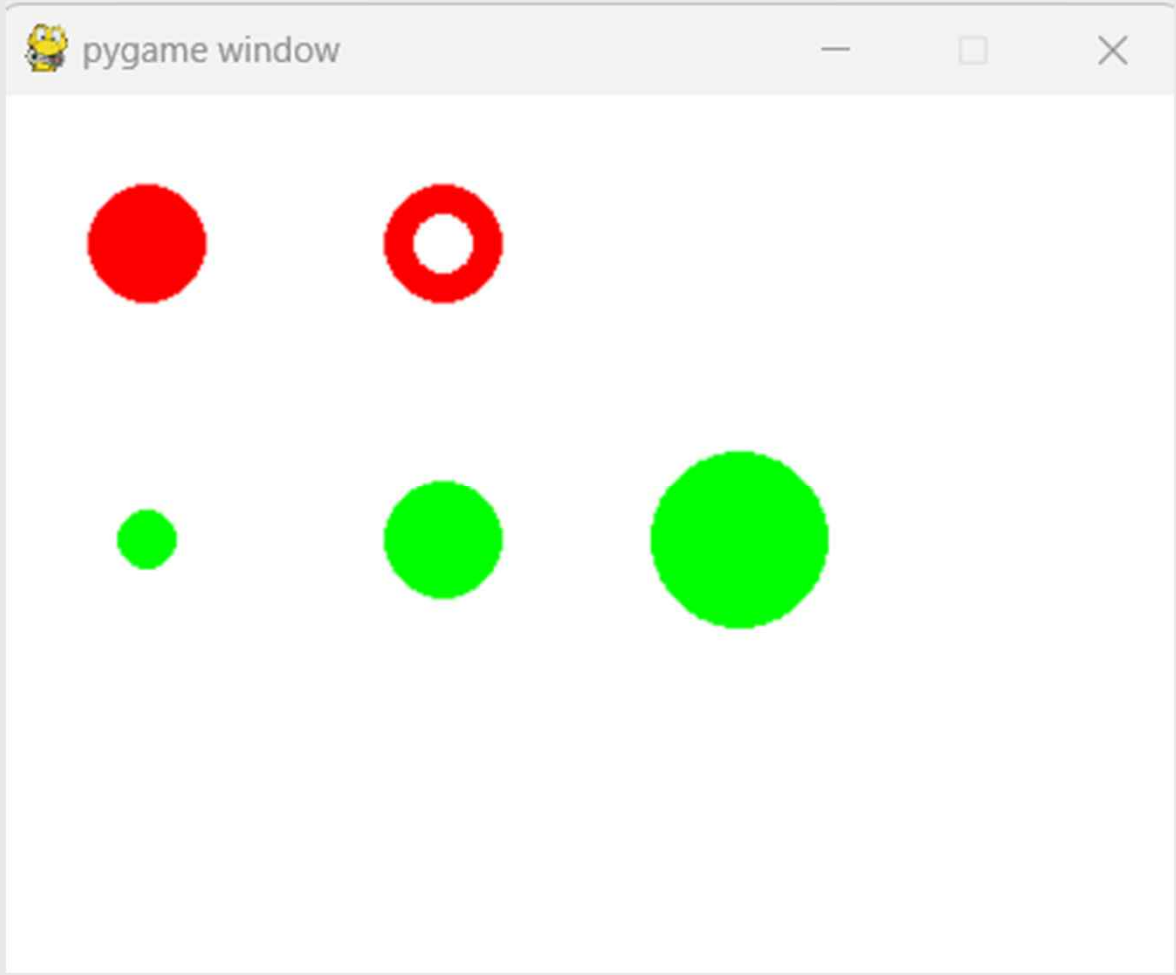
```
""" draw_circle.py """
import sys
import pygame
from pygame.locals import QUIT, Rect

pygame.init()
SURFACE = pygame.display.set_mode((400, 300))
FPSCLOCK = pygame.time.Clock()

def main():
    """ main routine """

    while True:
        for event in pygame.event.get():
            if event.type == QUIT:
                pygame.quit()
                sys.exit()

        SURFACE.fill((255, 255, 255))
```

```
SURFACE.fill((255, 255, 255))

# 빨간색: 빈틈없이 칠한다
pygame.draw.circle(SURFACE, (255, 0, 0), (50, 50), 20)
# 빨간색: 굵기 10
pygame.draw.circle(SURFACE, (255, 0, 0), (150, 50), 20, 10)

# 녹색: 반경10
pygame.draw.circle(SURFACE, (0, 255, 0), (50, 150), 10)
# 녹색: 반경20
pygame.draw.circle(SURFACE, (0, 255, 0), (150, 150), 20)
# 녹색: 반경30
pygame.draw.circle(SURFACE, (0, 255, 0), (250, 150), 30)

pygame.display.update()
FPSCLOCK.tick(3)
```


pygame window

ellipse 그리기

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ellipse(Surface, color, Rect, width=0) -> Rect

Surface: 그리는 대상이 되는 화면 (Surface 객체)

color: 색

Rect: 타원에 외접하는 직사각형의 위치와 크기

width: 선 폭(생략할 때는 꽉 채워 칠한다)

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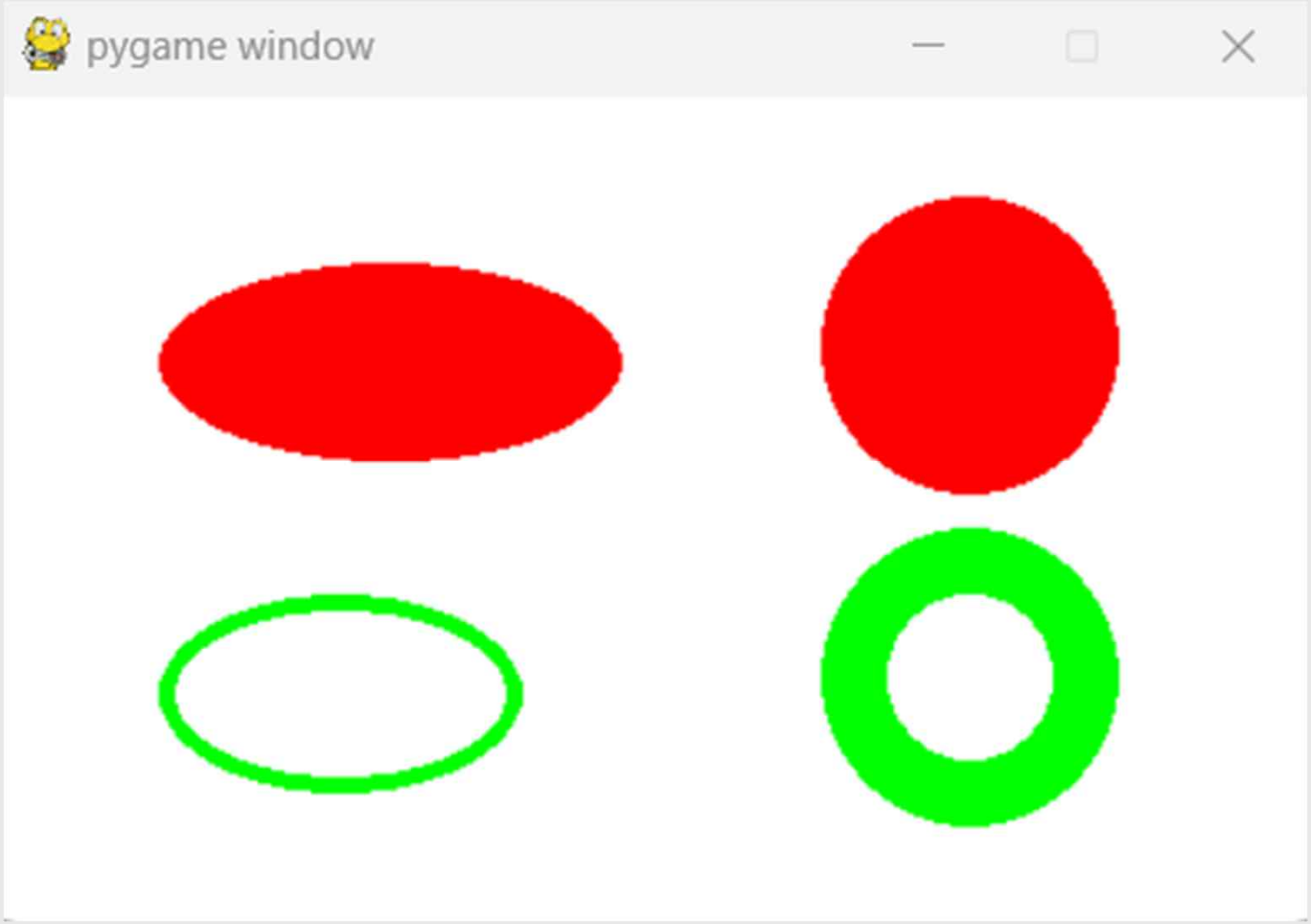
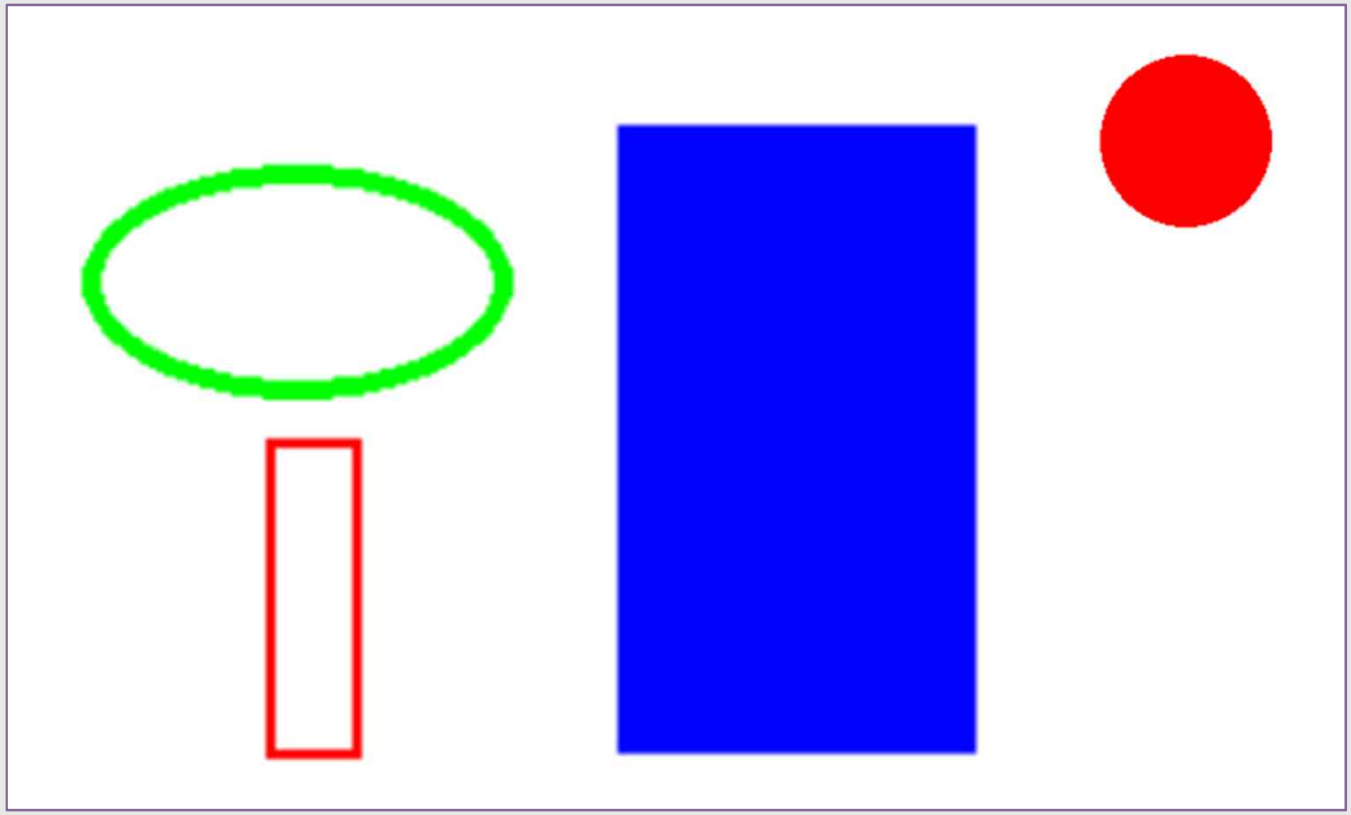
```
""" draw_ellipse.py """
import sys
import pygame
from pygame.locals import QUIT, Rect

pygame.init()
SURFACE = pygame.display.set_mode((400, 250))
FPSCLOCK = pygame.time.Clock()

def main():
    """ main routine """

    while True:
        for event in pygame.event.get():
            if event.type == QUIT:
                pygame.quit()
                sys.exit()

        SURFACE.fill((255, 255, 255))
```


pygame window



Q) Try above geometry

line 그리기

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line(Surface, color, start_pos, end_pos, width=1) -> Rect

Surface: 그리는 대상이 되는 화면 (Surface 객체)

color: 색

start_pos: 시작점

end_pos: 도착점

width: 선 폭

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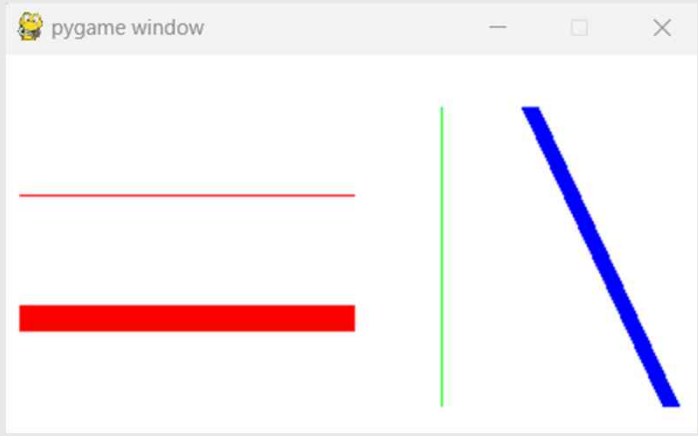
```
""" draw_line1.py """
import sys
import pygame
from pygame.locals import QUIT

pygame.init()
SURFACE = pygame.display.set_mode((400, 220))
FPSCLOCK = pygame.time.Clock()

def main():
    """ main routine """

    while True:
        for event in pygame.event.get():
            if event.type == QUIT:
                pygame.quit()
                sys.exit()
```



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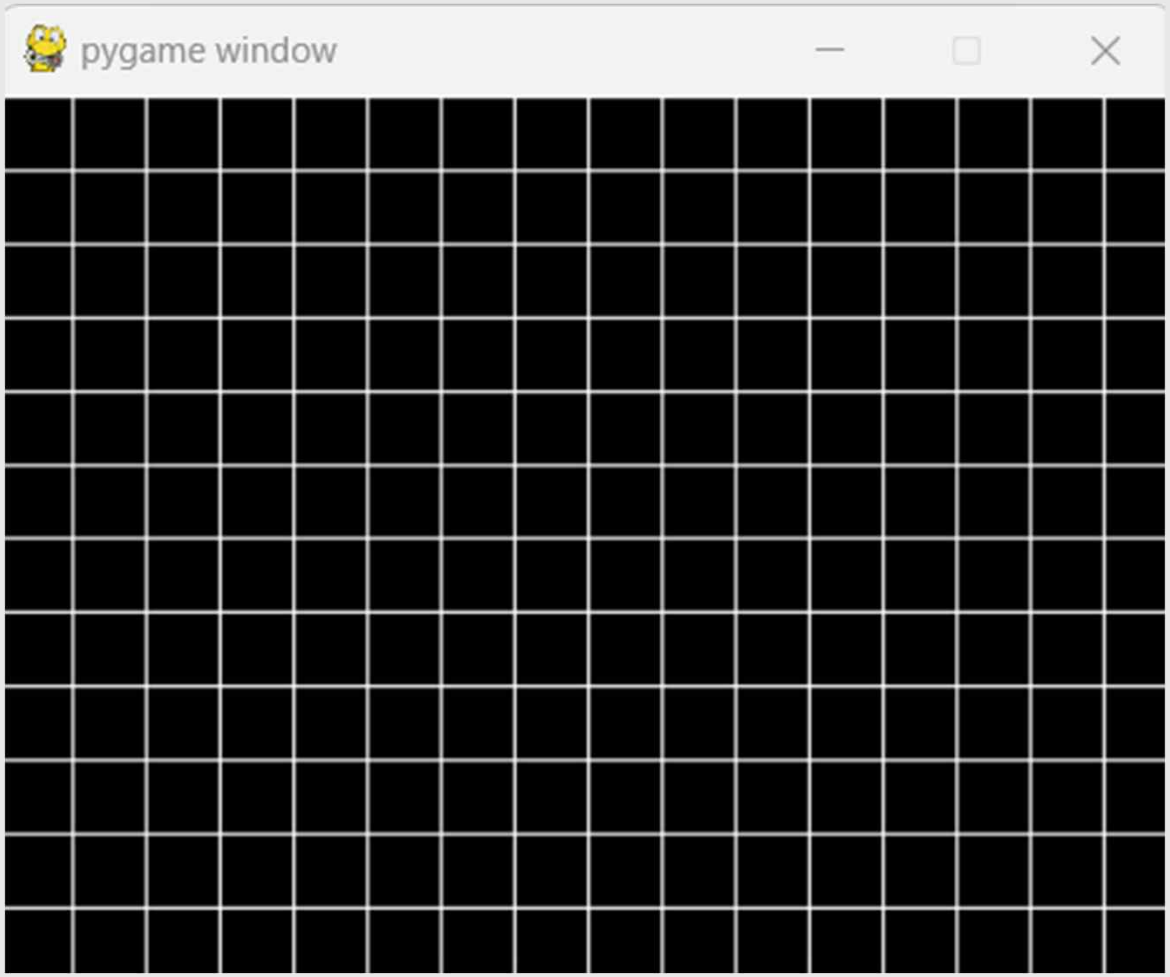
```
""" draw_line2.py """
import sys
import pygame
from pygame.locals import QUIT

pygame.init()
```

```
# 하얀색: 세로줄
for xpos in range(0, 400, 25):
    pygame.draw.line(SURFACE, 0xFFFFFF, (xpos, 0), (xpos, 300))

# 하얀색: 가로줄
for ypos in range(0, 300, 25):
    pygame.draw.line(SURFACE, 0xFFFFFF, (0, ypos), (400, ypos))
```


pygame window

lines 그리기

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lines(Surface, color, closed, pointlist, width=1) -> Rect

Surface: 그리는 대상이 되는 화면 (Surface 객체)

color: 색

closed: 시작점을 마지막 점에 이을지 여부

pointlist: 점의 리스트

width: 선 폭

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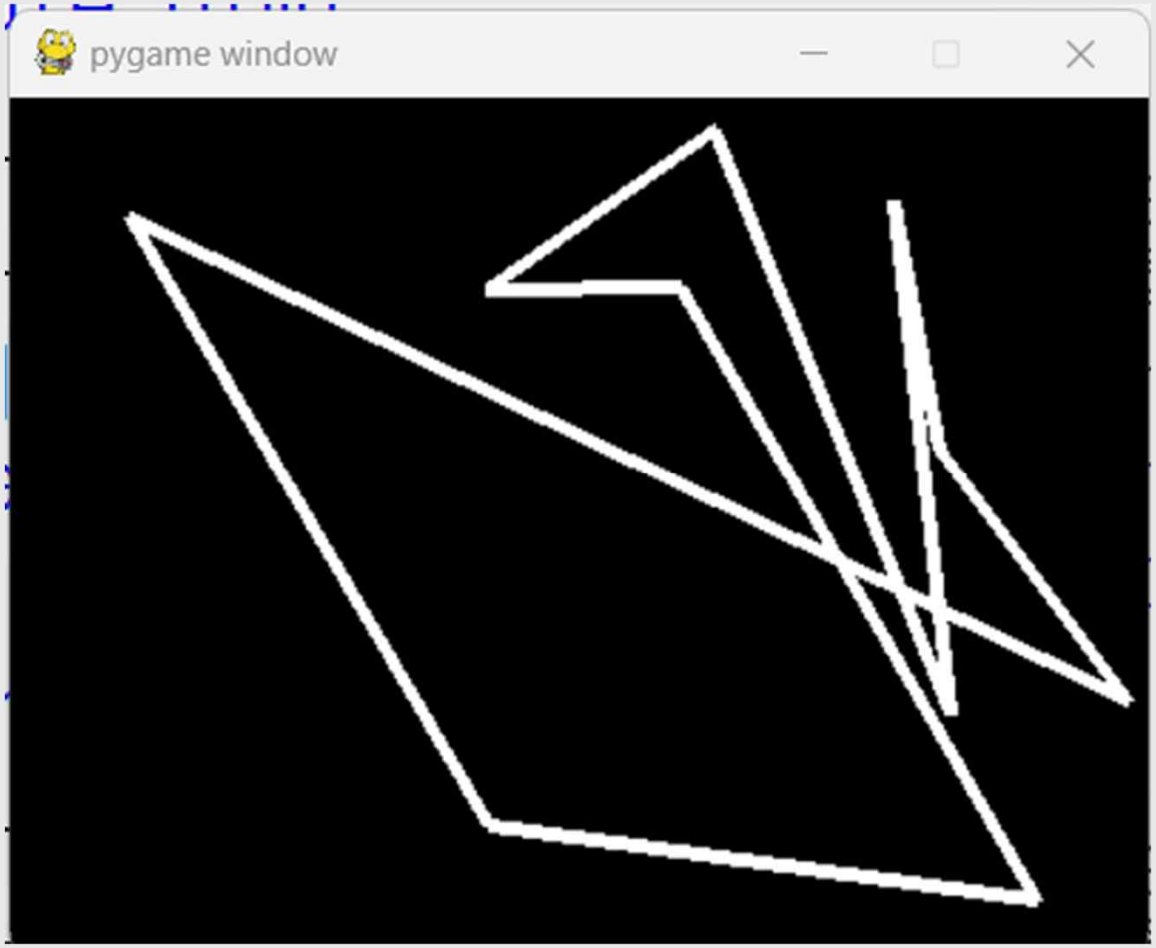
```
""" draw_lines0.py """
import sys
import random
import pygame
from pygame.locals import QUIT

pointlist = []
for _ in range(10):
    xpos = random.randint(0, 400)
    ypos = random.randint(0, 300)
    pointlist.append((xpos, ypos))

pygame.draw.lines(SURFACE, (255, 255, 255), True, pointlist, 5)
```



Q) Try to be stopped after 10 cycles

polygon 그리기

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polygon(Surface, color, pointlist, width=0) -> Rect

Surface: 그리는 대상이 되는 화면 (Surface 객체)

color: 색

pointlist: 점의 리스트

width: 선 폭(0일 때는 꽉 채워 칠한다)

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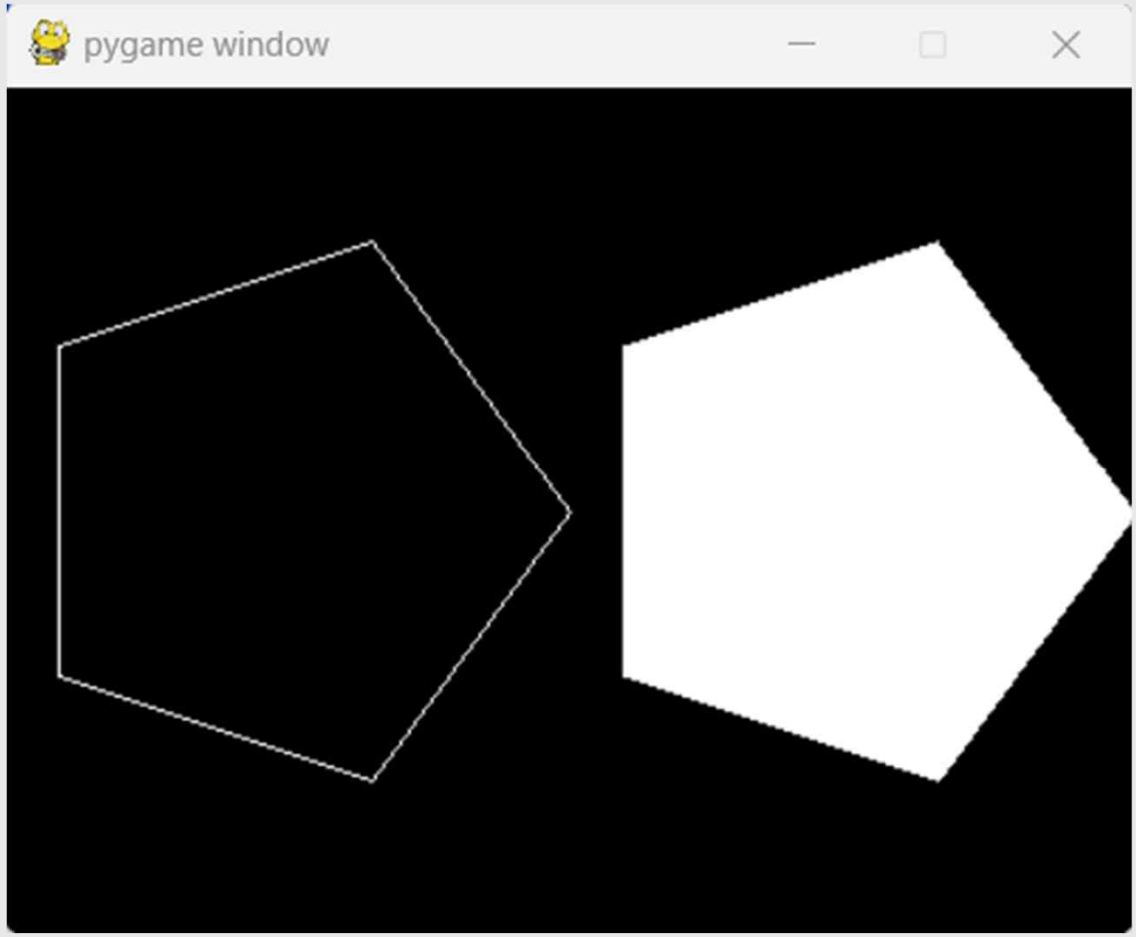
```
""" draw_polygon.py """
import sys
from math import sin, cos, radians
import pygame
from pygame.locals import QUIT
```

```
pointlist0, pointlist1 = [], []
for theta in range(0, 360, 72):
    rad = radians(theta)
    pointlist0.append((cos(rad)*100 + 100, sin(rad)*100 + 150))
    pointlist1.append((cos(rad)*100 + 300, sin(rad)*100 + 150))

pygame.draw.lines(SURFACE, (255, 255, 255), True, pointlist0)
pygame.draw.polygon(SURFACE, (255, 255, 255), pointlist1)
```


pygame window

blit (이미지 활용)

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load(filename) → Surface

filename: 이미지 파일

반환값으로 Surface 객체가 반환됩니다. 화면 전체를 나타내는 다른 S

해서 그립니다. Surface 복사는 blit 명령으로 실행합니다.

blit(source, dest, area=None, special_flags=0) -> Rect

source: 원본이 되는 Surface

dest: 복사하는 좌표(왼쪽 위)

area: 복사하는 영역(일부만 그릴 때)

special_flags: 복사할 때의 연산 방법

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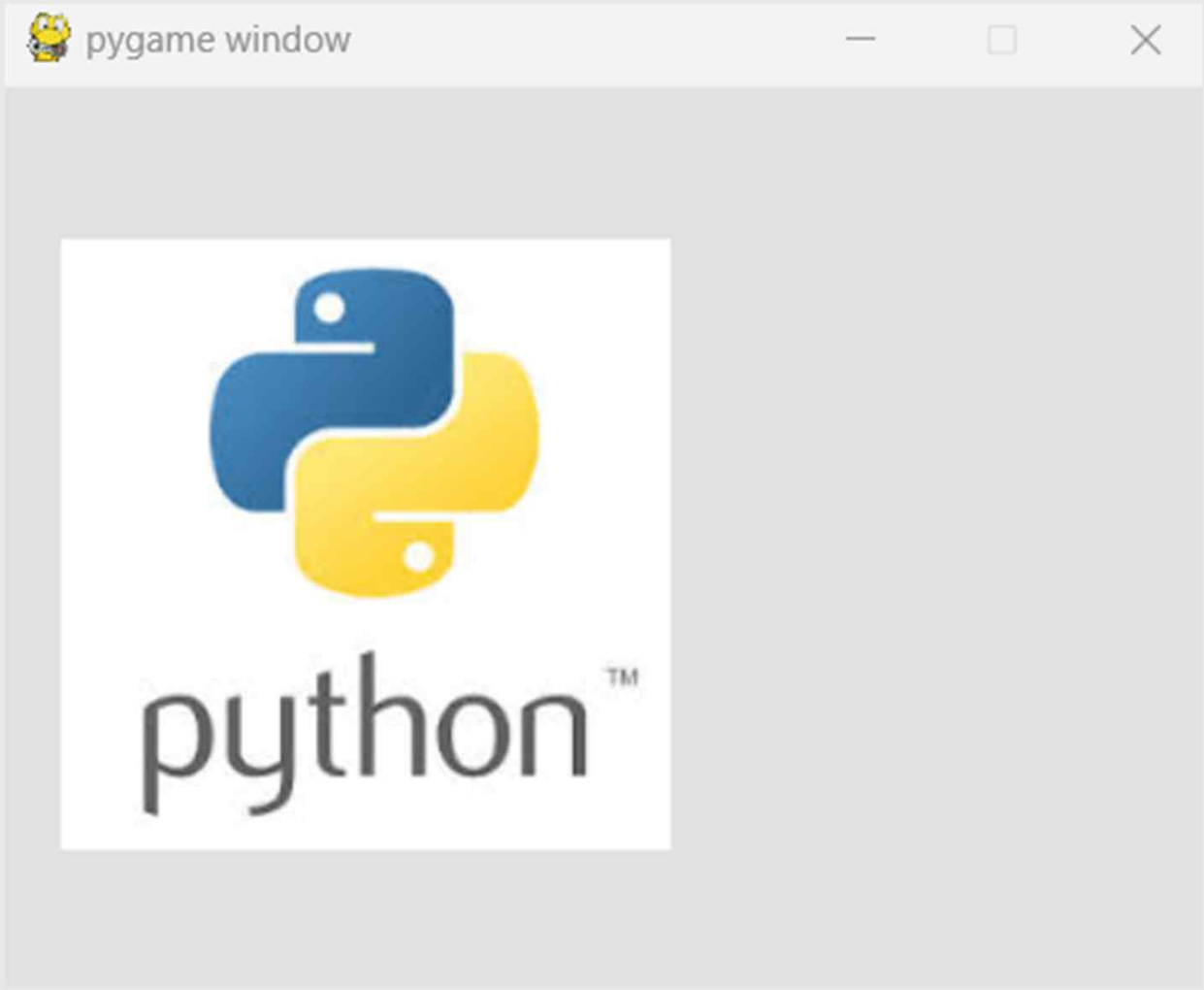
```
""" draw_image1.py """
import sys
import pygame
from pygame.locals import QUIT

pygame.init()
SURFACE = pygame.display.set_mode((400, 300))
FPSCLOCK = pygame.time.Clock()

def main():
    """ main routine """
    logo = pygame.image.load("pythonlogo.jpg")
```

```
# 왼쪽 위가 (20, 50) 위치에 로고를 그린다
SURFACE.blit(logo, (20, 50))
```


pygame window
python™

blit (subregion)

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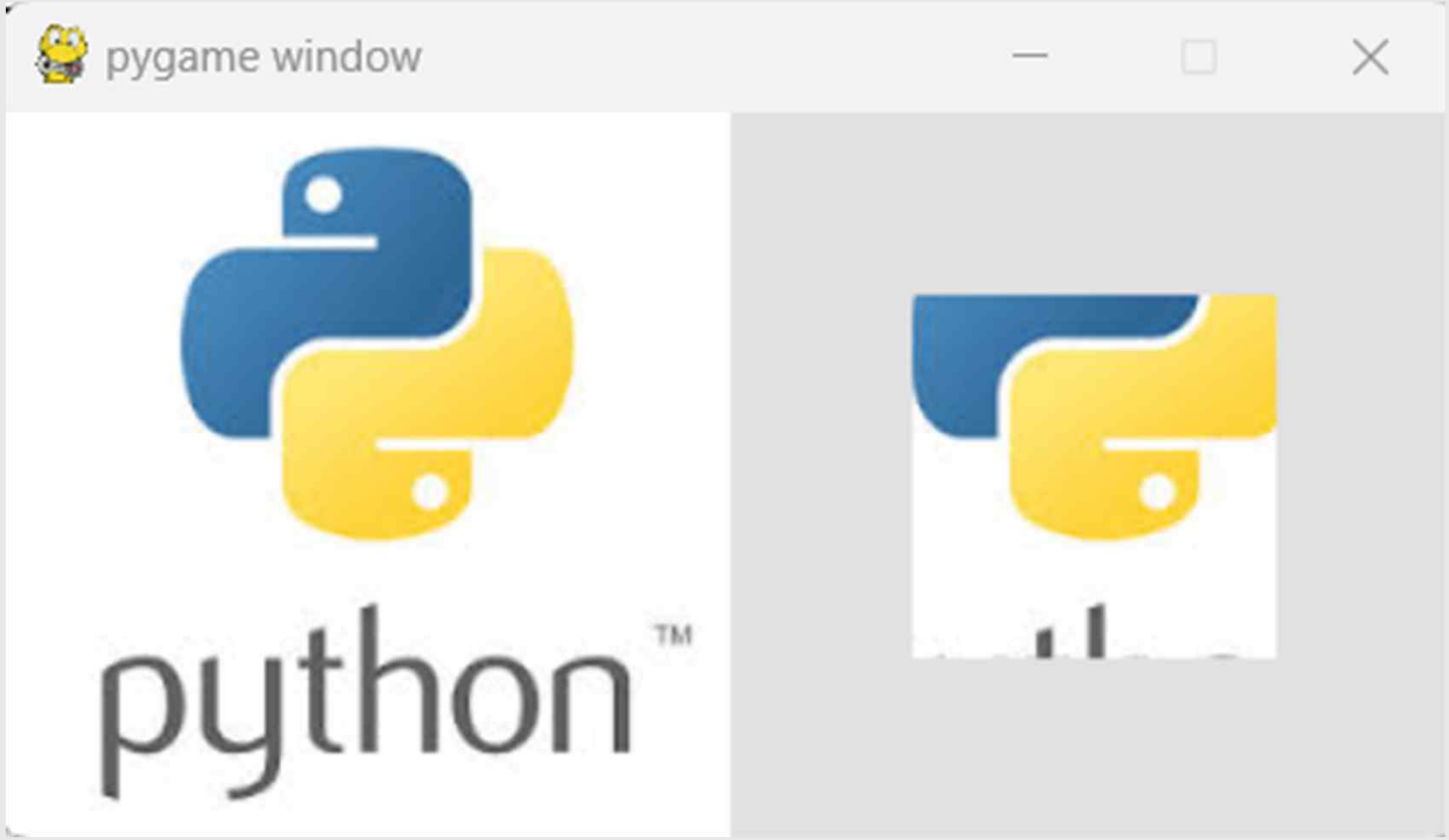
```
""" draw_image_subregion1.py """
import sys
import pygame
from pygame.locals import QUIT, Rect
```

```
SURFACE.fill((225, 225, 225))
SURFACE.blit(logo, (0, 0))
SURFACE.blit(logo, (250, 50), Rect(50, 50, 100, 100))
```


pygame window
python™

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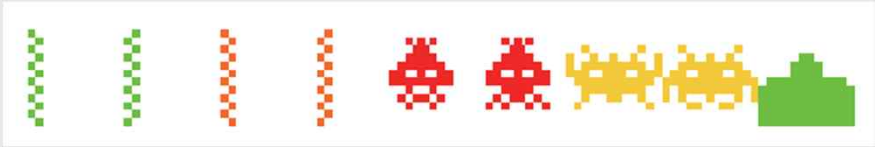
```
""" draw_image_subregion2.py """
import sys
import pygame
from pygame.locals import QUIT, Rect, KEYDOWN, K_LEFT, K_RIGHT

pygame.init()
pygame.key.set_repeat(5, 5)
SURFACE = pygame.display.set_mode((300, 200))
FPSCLOCK = pygame.time.Clock()
```



```
strip = pygame.image.load("strip.png")
```

```
image = pygame.Surface((24, 24))
```

```
image.blit(strip, (0, 0), Rect(index * 24, 0, 24, 24))
```

```
def main():
    """ main routine """
    strip = pygame.image.load("strip.png")
    images = []
    for index in range(9):
        image = pygame.Surface((24, 24))
        image.blit(strip, (0, 0), Rect(index * 24, 0, 24, 24))
        images.append(image)

    counter = 0
    pos_x = 100
    while True:
        for event in pygame.event.get():
            if event.type == QUIT:
                pygame.quit()
                sys.exit()
            elif event.type == KEYDOWN:
                if event.key == K_LEFT:
                    pos_x -= 5
                elif event.key == K_RIGHT:
                    pos_x += 5

        SURFACE.fill((0, 0, 0))

        SURFACE.blit(images[counter % 2 + 0], (50, 50))
        SURFACE.blit(images[counter % 2 + 2], (100, 50))
        SURFACE.blit(images[counter % 2 + 4], (150, 50))
        SURFACE.blit(images[counter % 2 + 6], (200, 50))
        counter += 1

        SURFACE.blit(images[8], (pos_x, 150))
```

blit (rotation)

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rotate(Surface, angle) → Surface

Surface: 회전 대상이 되는 Surface

angle: 회전각

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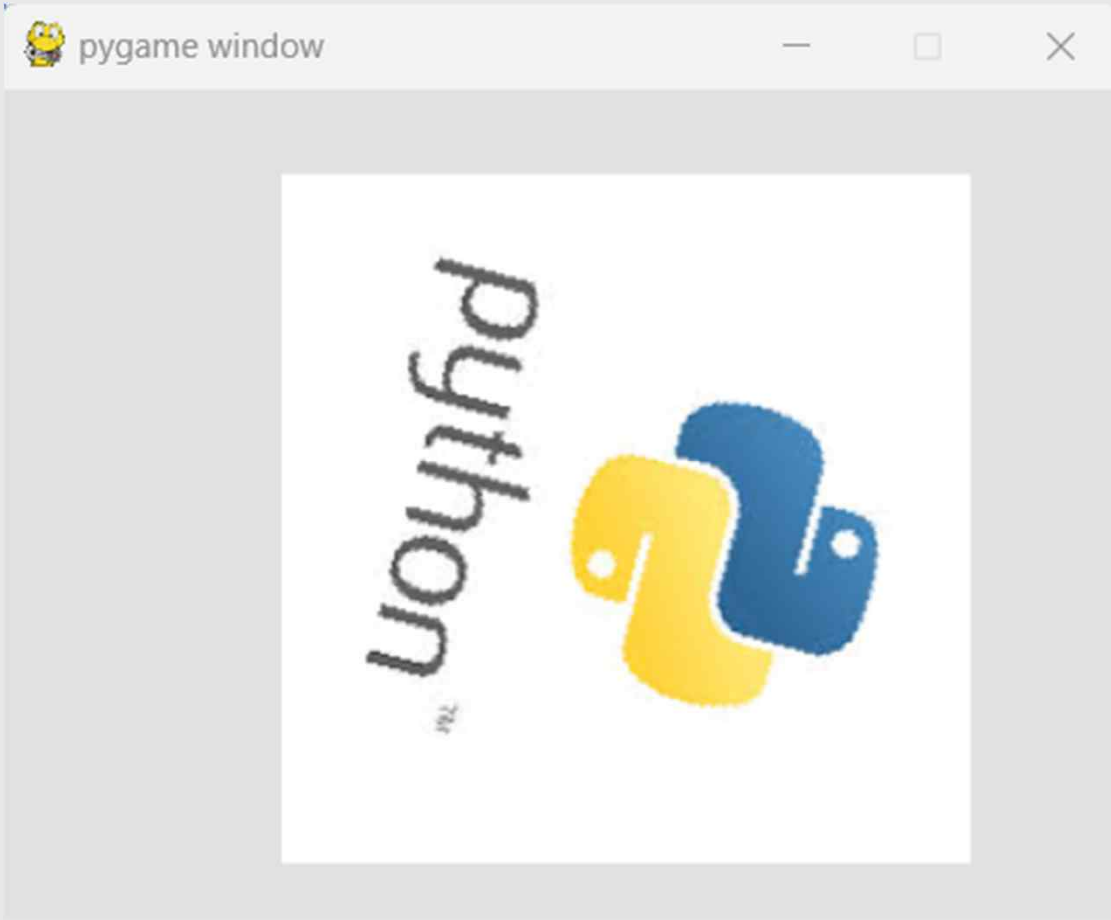
```
""" draw_image3.py """
import sys
import pygame
from pygame.locals import QUIT

pygame.init()
SURFACE = pygame.display.set_mode((400, 300))
FPSCLOCK = pygame.time.Clock()
```

```
theta += 1

SURFACE.fill((225, 225, 225))

# 로고를 회전하고, 왼쪽 위가 (100, 30) 위치에 로고를 그린다
new_logo = pygame.transform.rotate(logo, theta)
SURFACE.blit(new_logo, (100, 30))
```


pygame window
python

draw_image4.py

File Edit Format Run Options Window Help

```
""" draw_image4.py """
import sys
import pygame
from pygame.locals import QUIT
```

```
# 로고를 회전하고, 중심이 (200, 150)위치에 로고를 그린다
new_logo = pygame.transform.rotate(logo, theta)
rect = new_logo.get_rect()
rect.center = (200, 150)
SURFACE.blit(new_logo, rect)
```


pygame window
python

문자

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pygame.font.SysFont(name, size, bold=False, italic=False) → Font

name: 폰트명, 기본 폰트를 사용하려면 None을 지정

size: 폰트 크기

bold: 굵은체인지 아닌지, 생략할 때는 False

italic: 이탤릭인지 아닌지, 생략할 때는 False

render(text, antialias, color, background=None) -> Surface

text: 그리는 텍스트

antialias: 안티앨리언스(윤곽을 부르럽게)

color: 색

background: 배경색

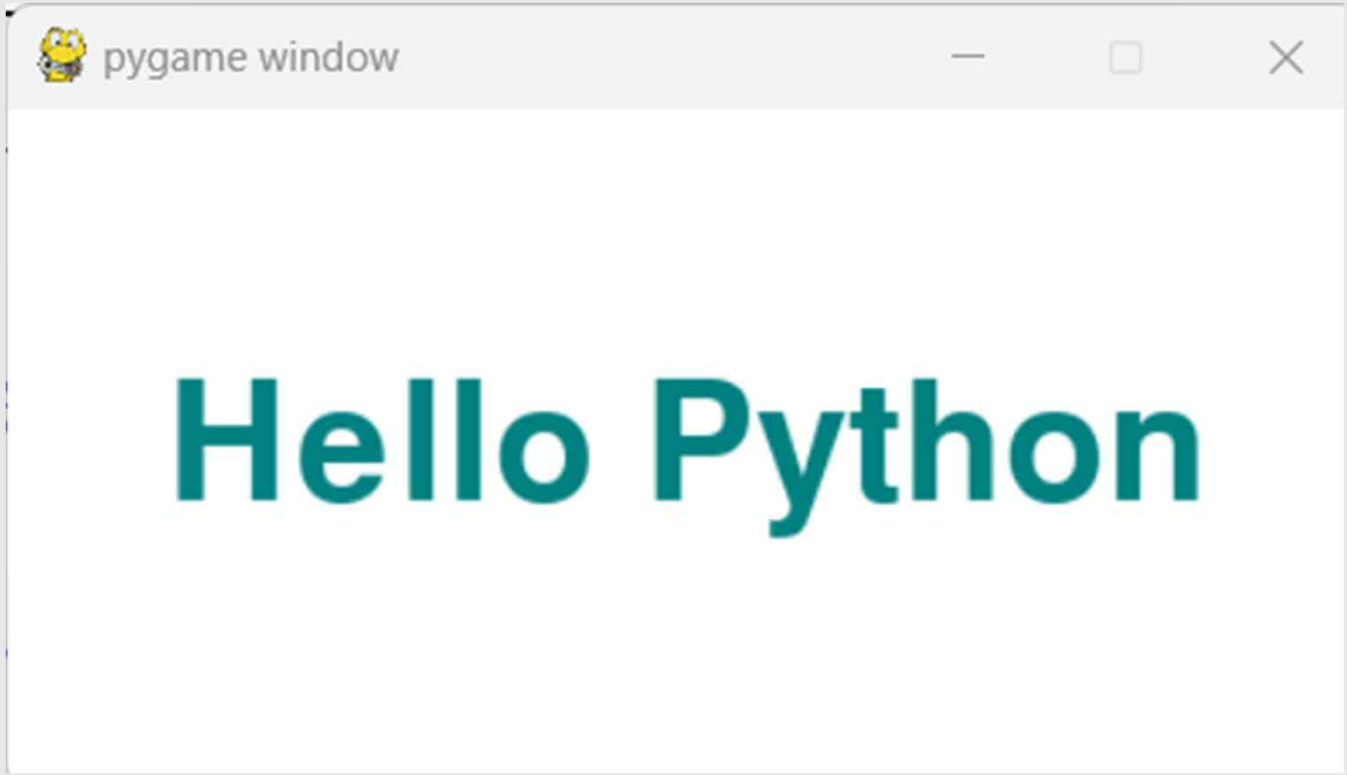
draw_text1.py - C:\Users\...

File Edit Format Run Options Window Help

```
""" draw_text1.py """
import sys
import pygame
from pygame.locals import QUIT
```

```
def main():
    sysfont = pygame.font.SysFont(None, 72)
    message = sysfont.render("Hello Python", True, (0, 128, 128))
    message_rect = message.get_rect()
    message_rect.center = (200, 100)
```

```
SURFACE.fill((255, 255, 255))
SURFACE.blit(message, message_rect)
```


pygame window
Hello Python

문자(rotozoom)

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rotozoom(Surface, angle, scale) -> Surface

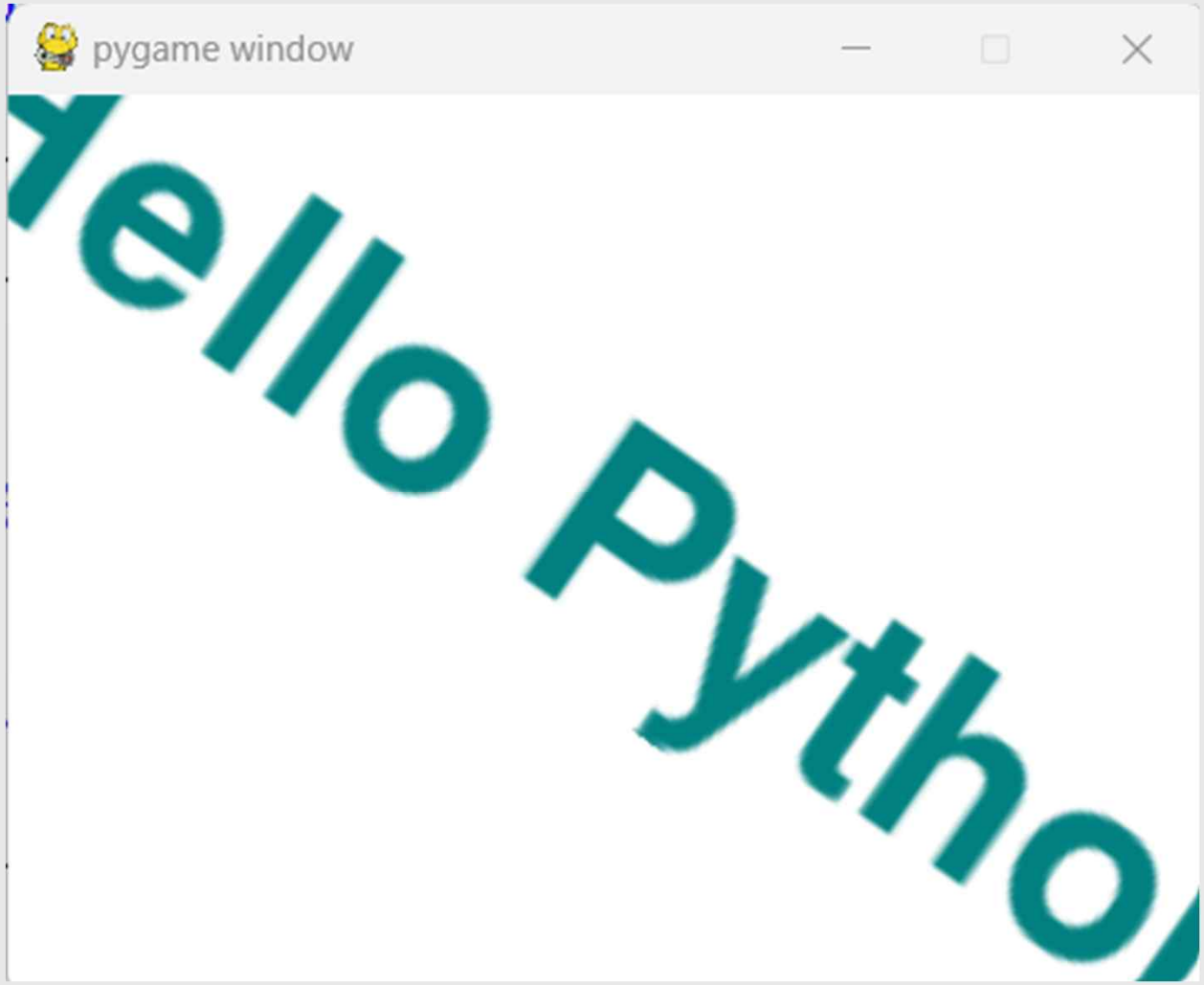
Surface: 회전과 줌을 하는 Surface

angle: 회전각

scale: 줌 배율

```
ile  Edit  Format  Run  Options  Window  Help
""" draw_text2.py """
import sys
import pygame
from pygame.locals import QUIT
```

```
SURFACE.fill((255, 255, 255))
theta += 5
scale = (theta % 360) / 180
tmp_msg = pygame.transform.rotozoom(message, theta, scale)
tmp_rect = tmp_msg.get_rect()
tmp_rect.center = (200, 150)
SURFACE.blit(tmp_msg, tmp_rect)
```


pygame window
Hello Pytho

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The End