

SC101

Week 1



Gibbs (史瑞晨)



Henry (林佑詮)

李諒哲 呂胤憲 李浩瑋 柯嘉琳

黃文瑞 雷元鈞 陳家渝 董珍沁 唐寧

張元榮 劉虹妘 莊晴晴 莊芝彤

張淳裔 吳聲浩 阮靖淳 楊惠期



Dennis (廖偉廷)

柳冠鈴 黃科謬 俞學洋 張智鈞

鄭羽健 李孟軒 林煒松 詹景旭

錢建志

Mac

Windows

python3 -m pip install --upgrade pip

py -m pip install --upgrade pip

python3 -m pip install campy

py -m pip install campy

Mac

Windows

檢查是否安裝成功：

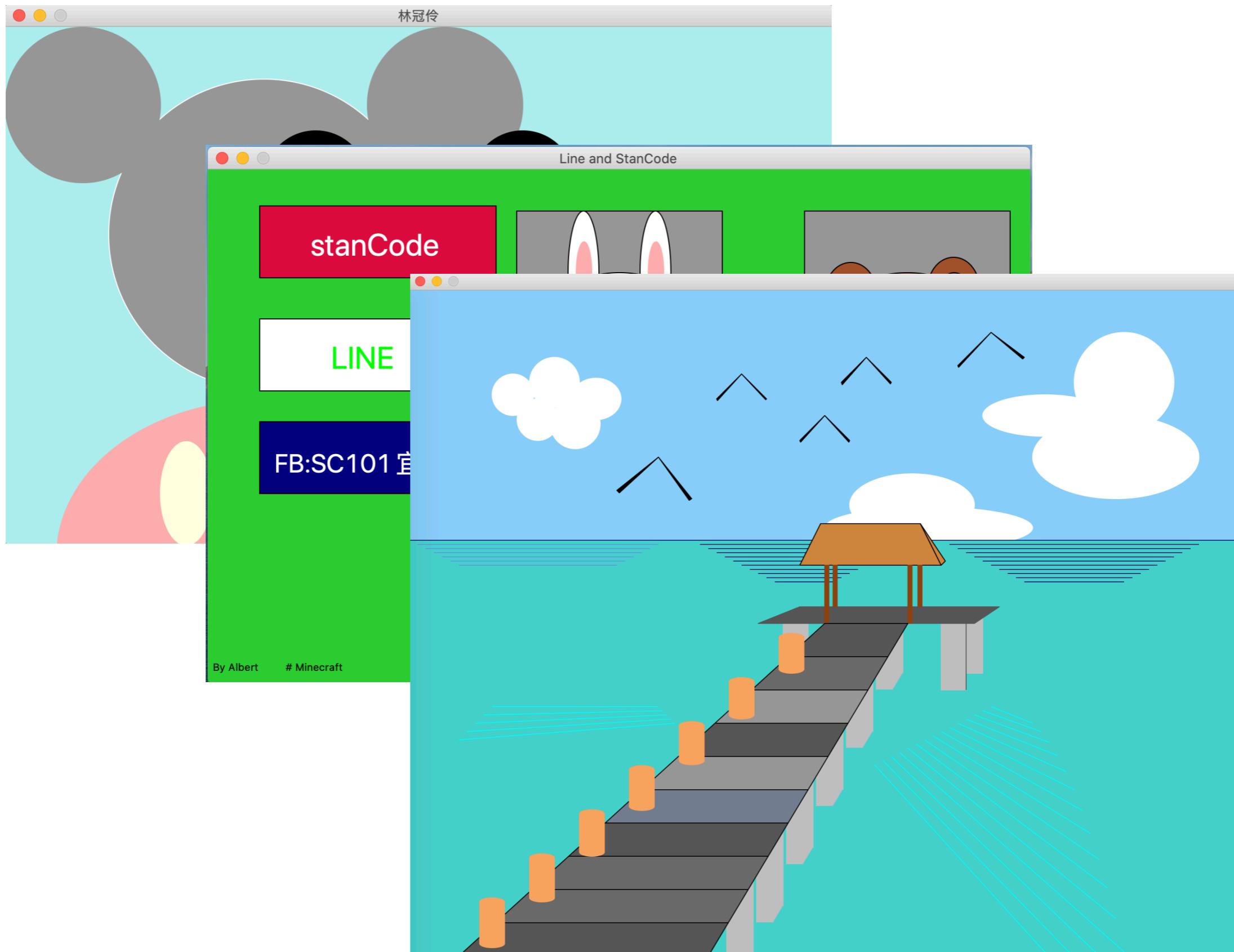
python3 -m pip show campy

檢查是否安裝成功：

py -m pip show campy

```
00 python3 -m pip show campy
Name: campy
Version: 0.0.1.dev19
Summary: Stanford's introductory libraries in Python, including the ACM graphical libraries.
Home-page: https://campy.sredmond.io
Author: Sam Redmond
Author-email: sredmond@stanford.edu
License: MIT
Location: /Library/Frameworks/Python.framework/Versions/3.7/lib/python3.7/site-packages
Requires:
Required-by:
```

| 日期 | 時間 | SC101 課程大綱 |
|------------|----------------|---|
| 01/30 (六) | 1530-1800 第一堂 | Python 繪圖、動畫製作概念、滑鼠偵測 |
| | 1900-2130 第二堂 | |
| 02/06 (六) | 1530-1800 第三堂 | 物件導向入門、進階物件導向、系統安全設計 |
| | 1900-2130 第四堂 | |
| *02/20 (六) | 1530-1800 第五堂 | 基礎資料結構 (list, stack, queue, dict, tuple) Big-Oh, 終端機指令 |
| | 1900-2130 第六堂 | |
| 03/06 (六) | 1530-1800 第七堂 | 進階資料結構、Python 內建函式、lambda、 tkinter 繪圖、Python爬蟲 |
| | 1900-2130 第八堂 | |
| 03/13 (六) | 1530-1800 第九堂 | 遞迴觀念建構、遞迴圖像、遞迴搜尋演算法 |
| | 1900-2130 第十堂 | |
| 03/20 (六) | 1530-1800 第十一堂 | 優先佇列、二元搜尋樹、壓縮/解壓縮 |
| | 1900-2130 第十二堂 | |
| 03/27 (六) | 1530-1800 第十三堂 | 期末測驗、期末檢討、進階演算法 |
| | 1900-2130 第十四堂 | |

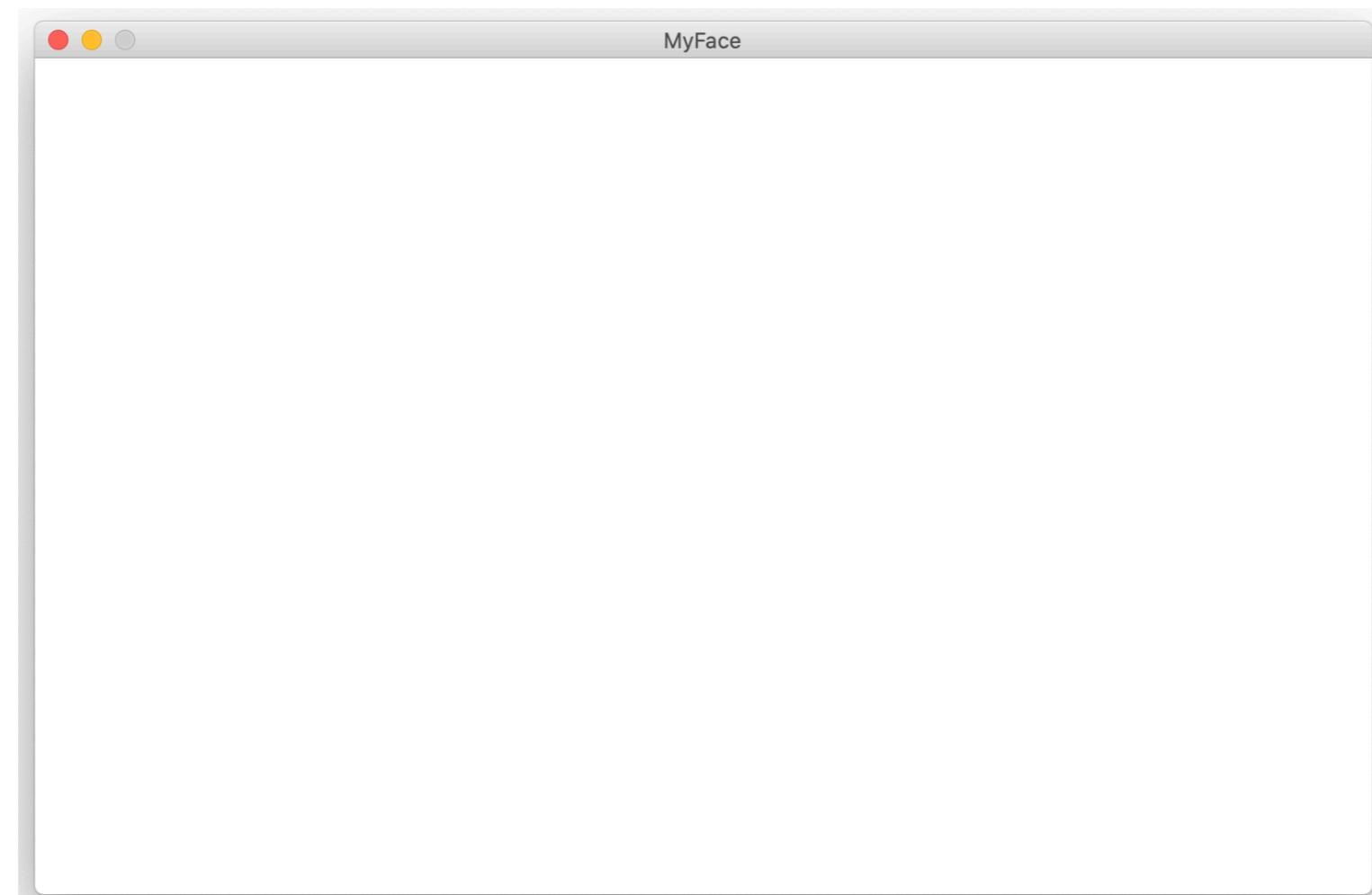


```
from campy.graphics.gobjects import G0val, GRect
from campy.graphics.gwindow import GWindow

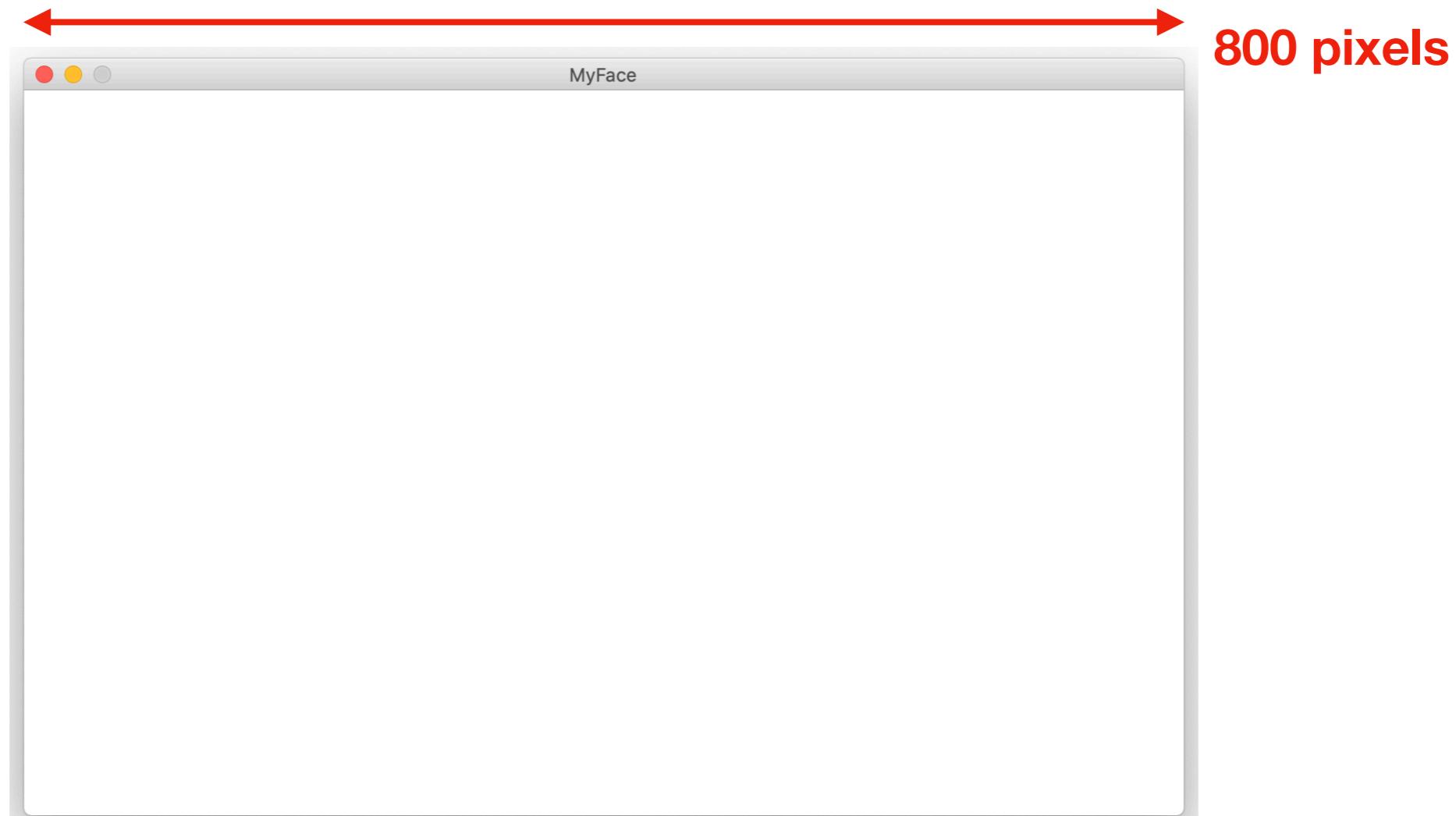
def main():
    window = GWindow(width=800, height=500, title='MyFace')
    face = G0val(200, 250, x=350, y=200)
    window.add(face)
    l_eye = G0val(50, 50, x=390, y=230)
    window.add(l_eye)
    r_eye = G0val(50, 50, x=450, y=230)
    window.add(r_eye)
    mouth = GRect(120, 40, x=390, y=360)
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```

```
from campy.graphics.gobjects import G0val, GRect  
from campy.graphics.gwindow import GWindow
```

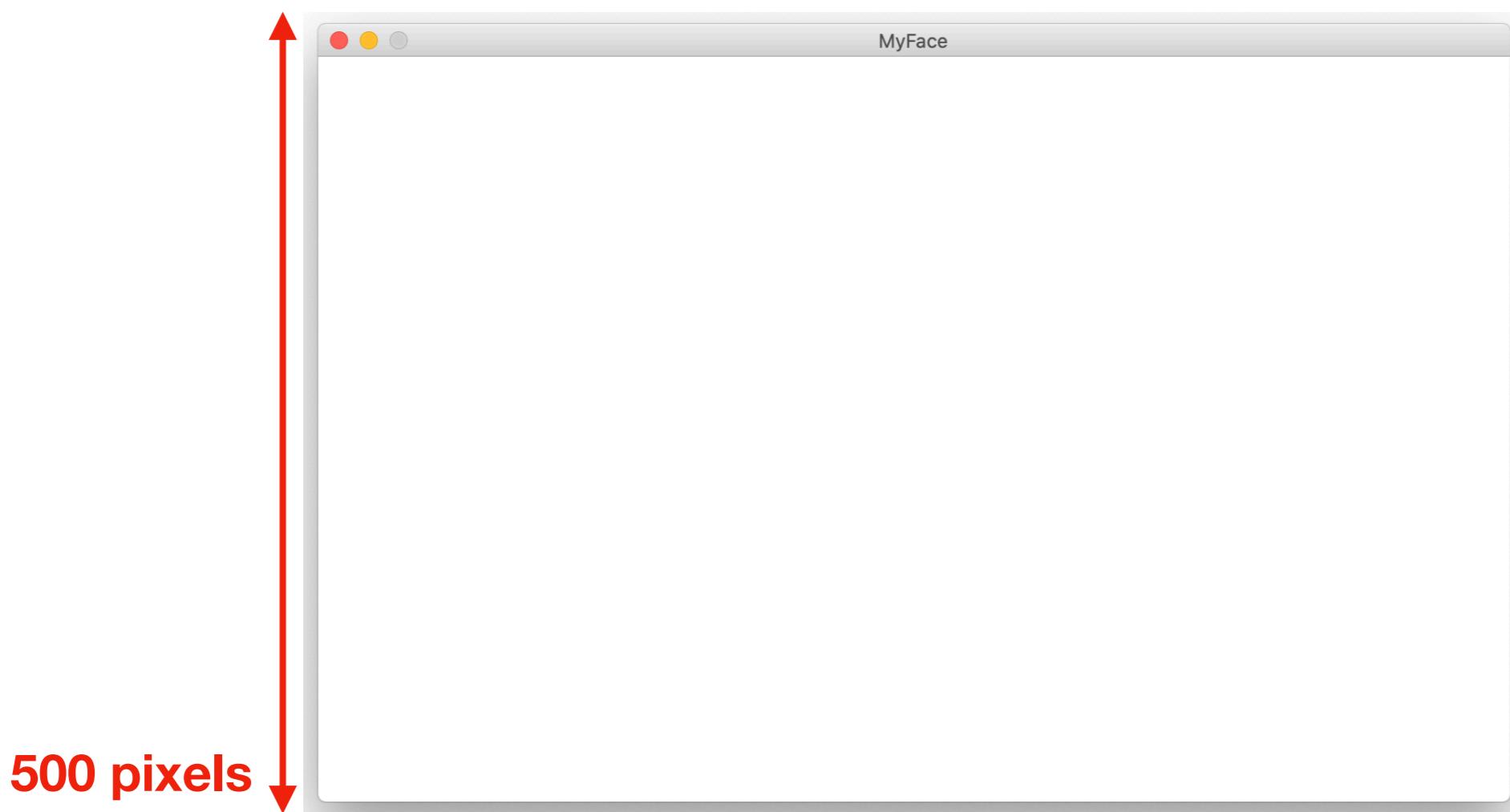
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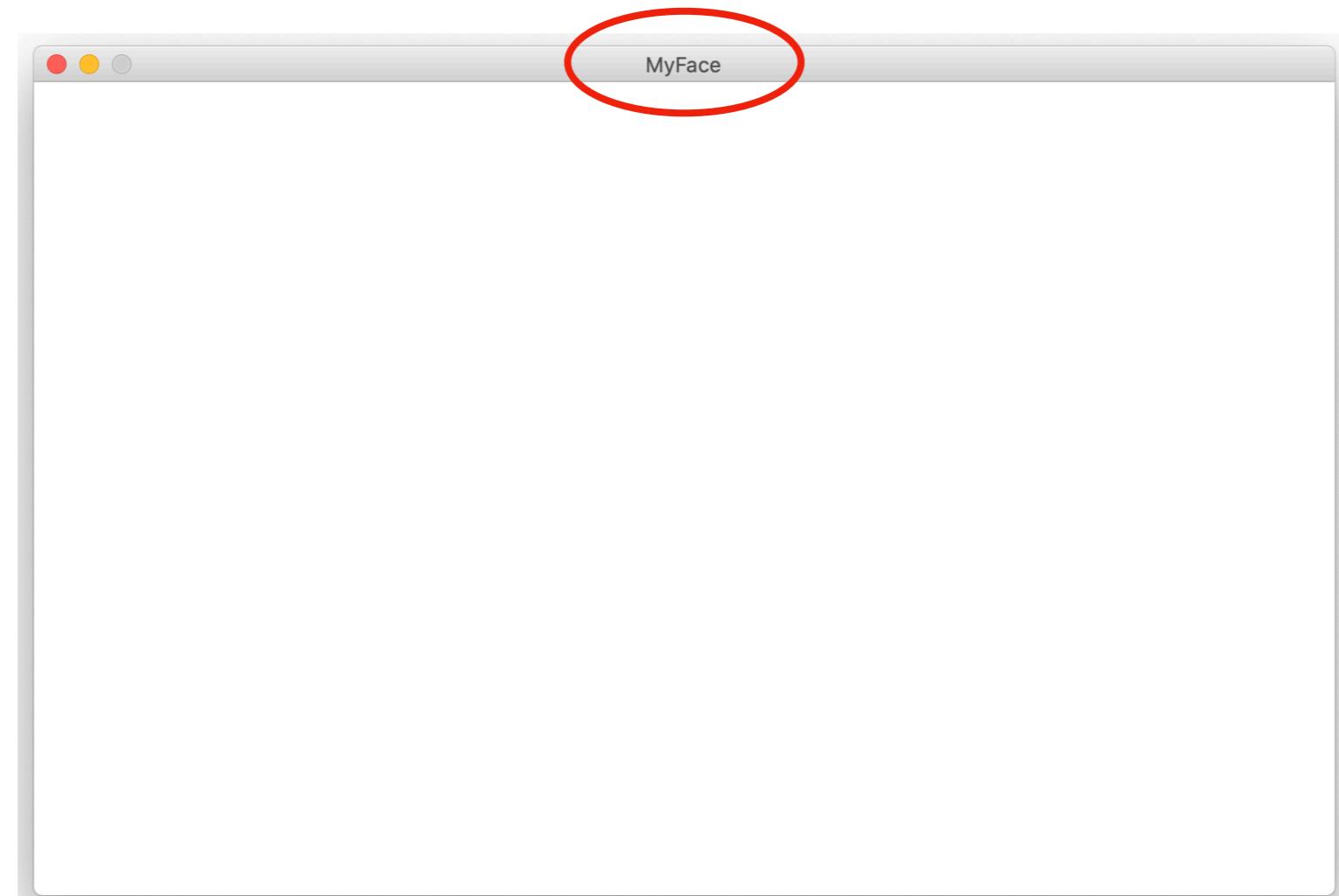
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```
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from campy.graphics.gwindow import GWindow
```

face

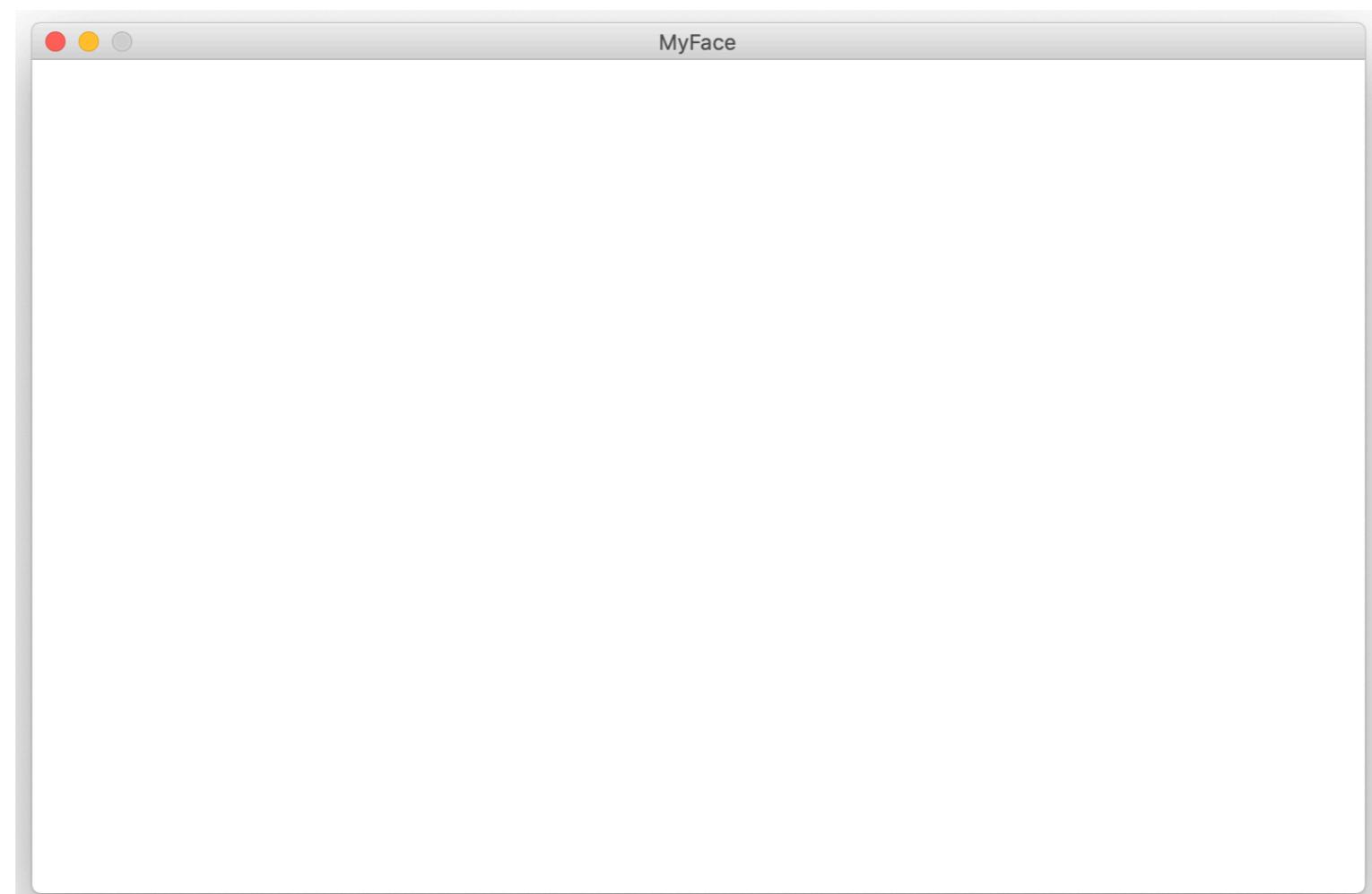
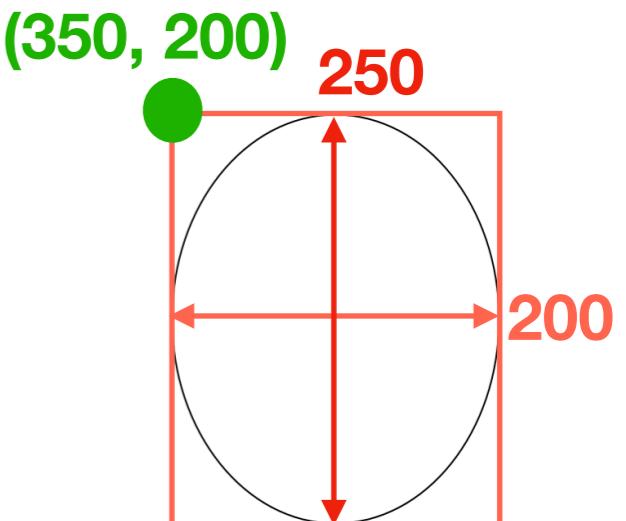
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```
from campy.graphics.gobjects import Goval, GRect  
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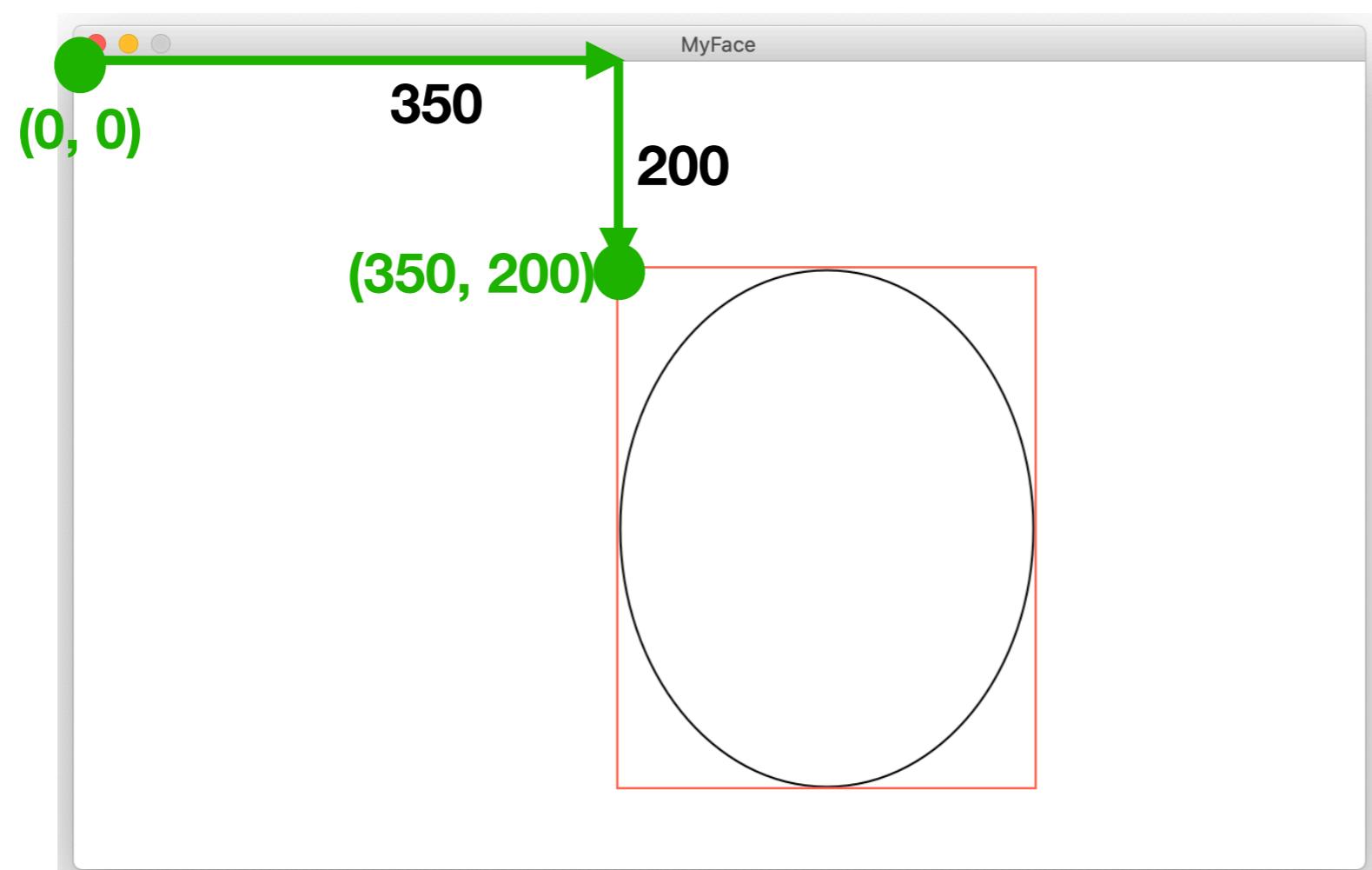
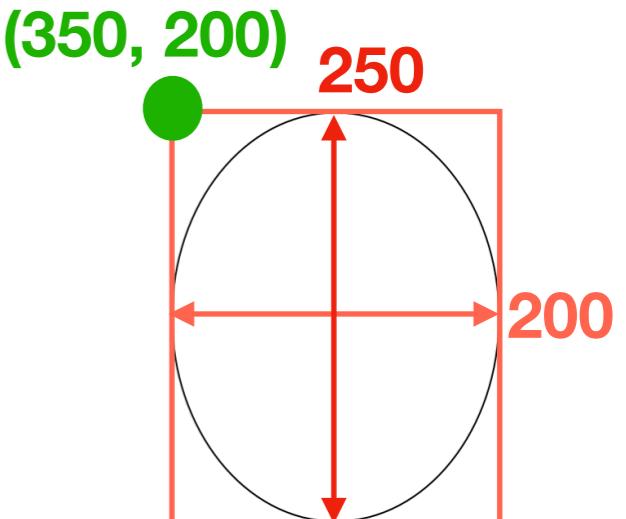
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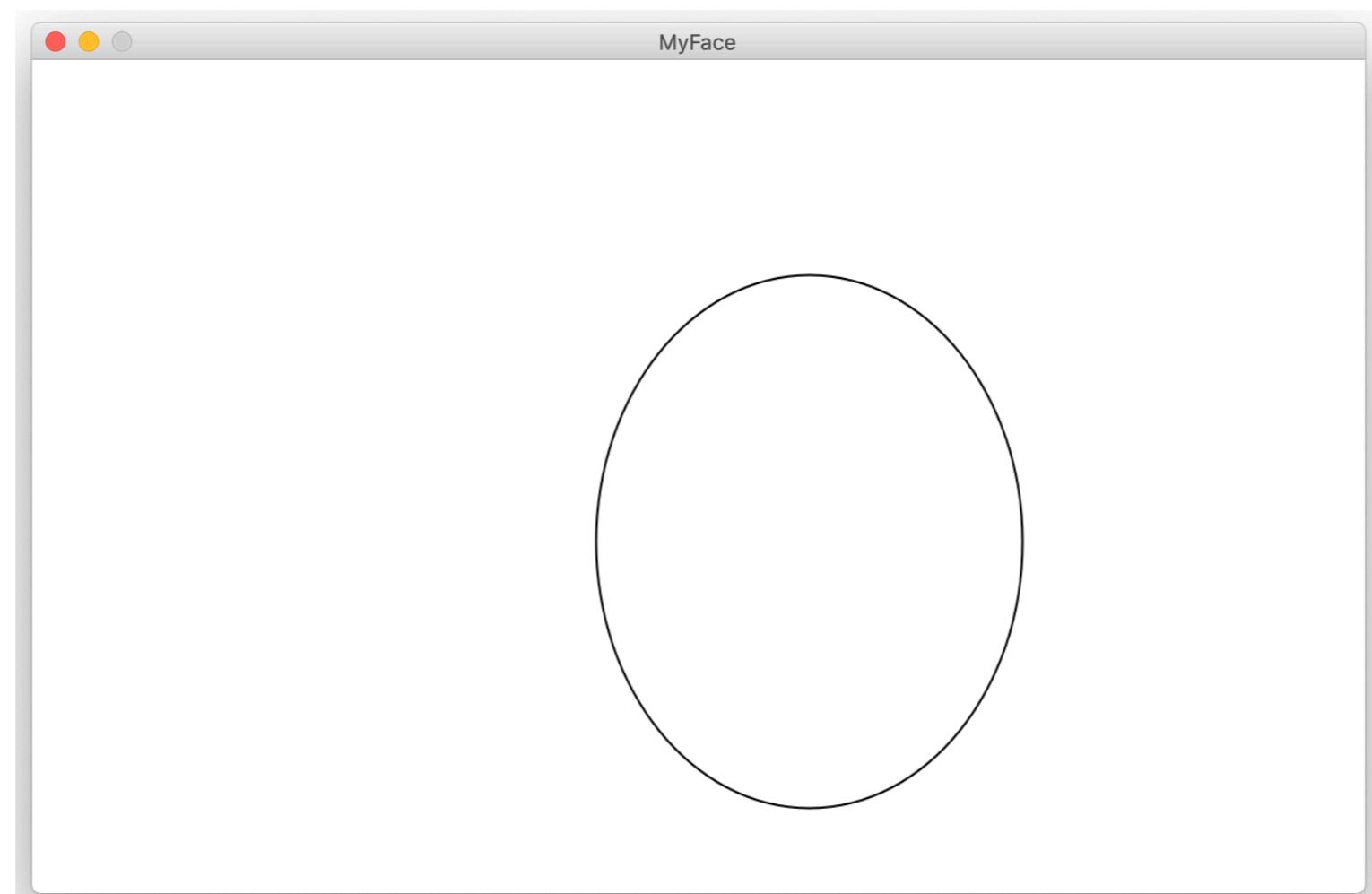


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```
from campy.graphics.gobjects import Goval, GRect
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l_eye

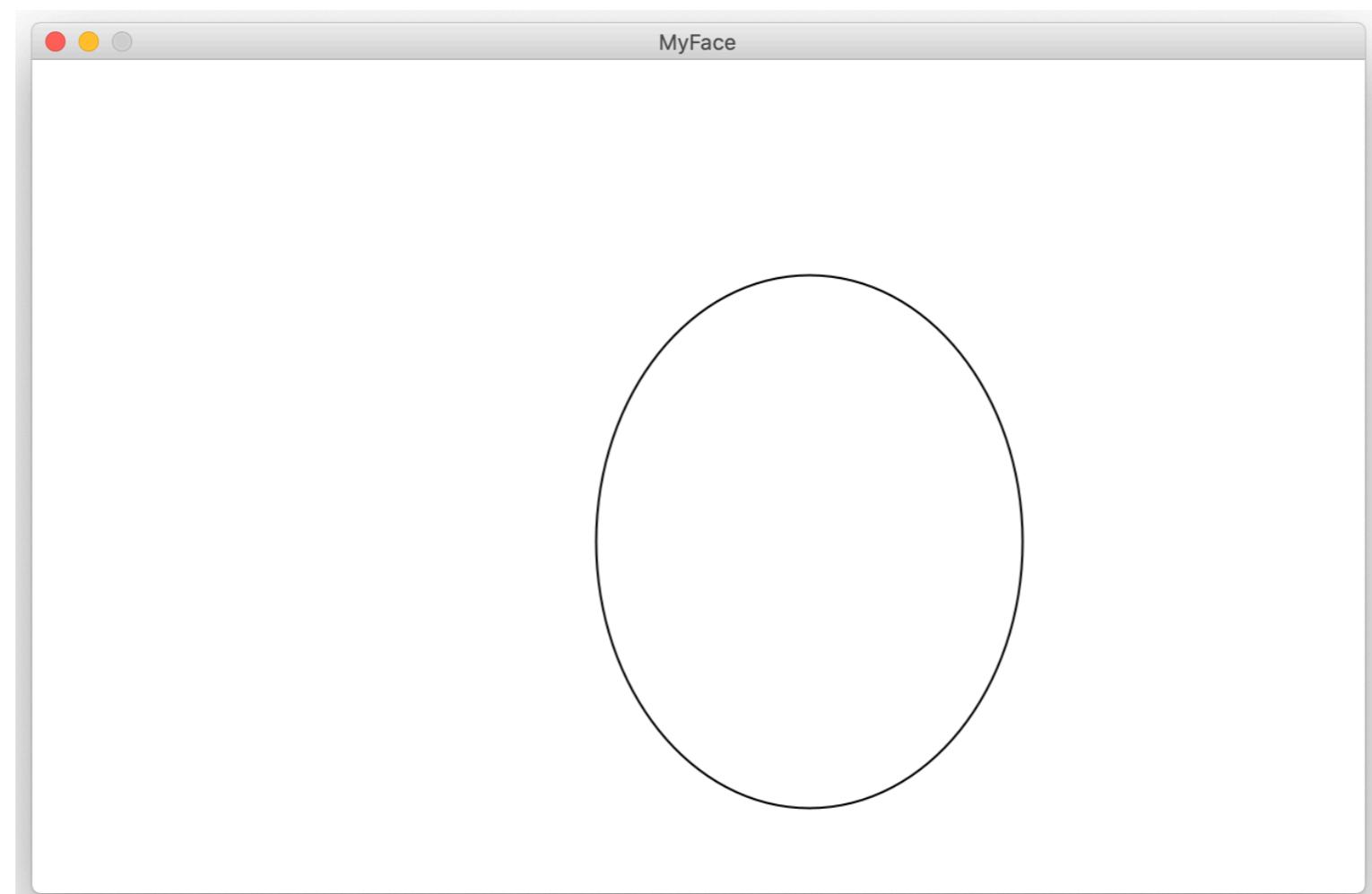
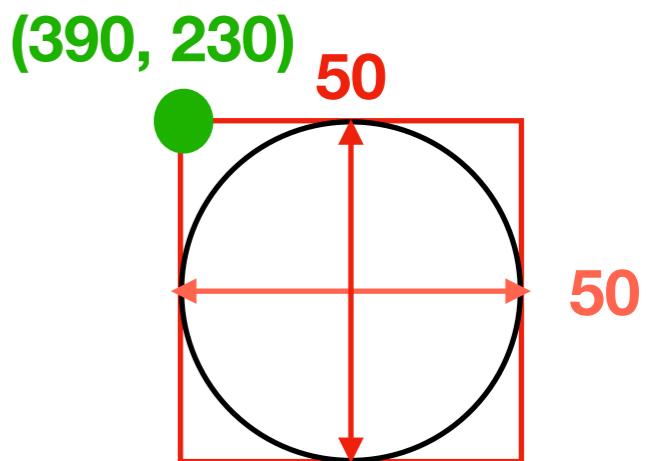
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l_eye

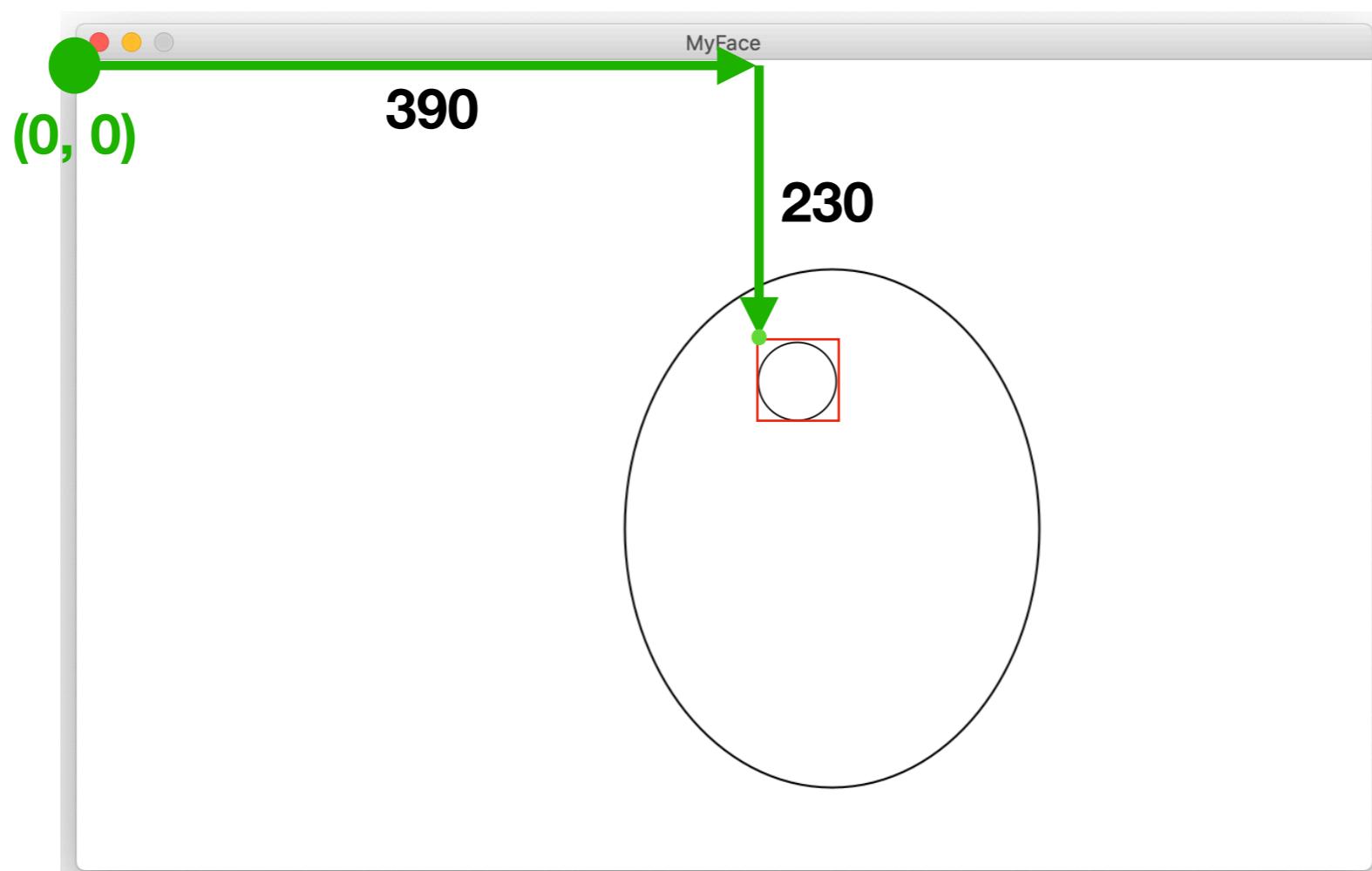
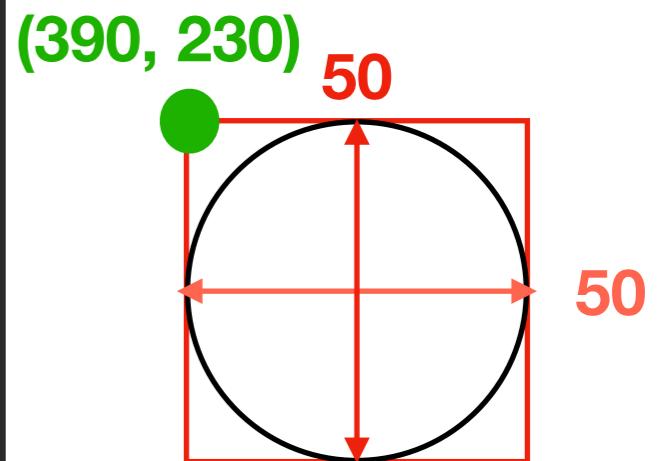
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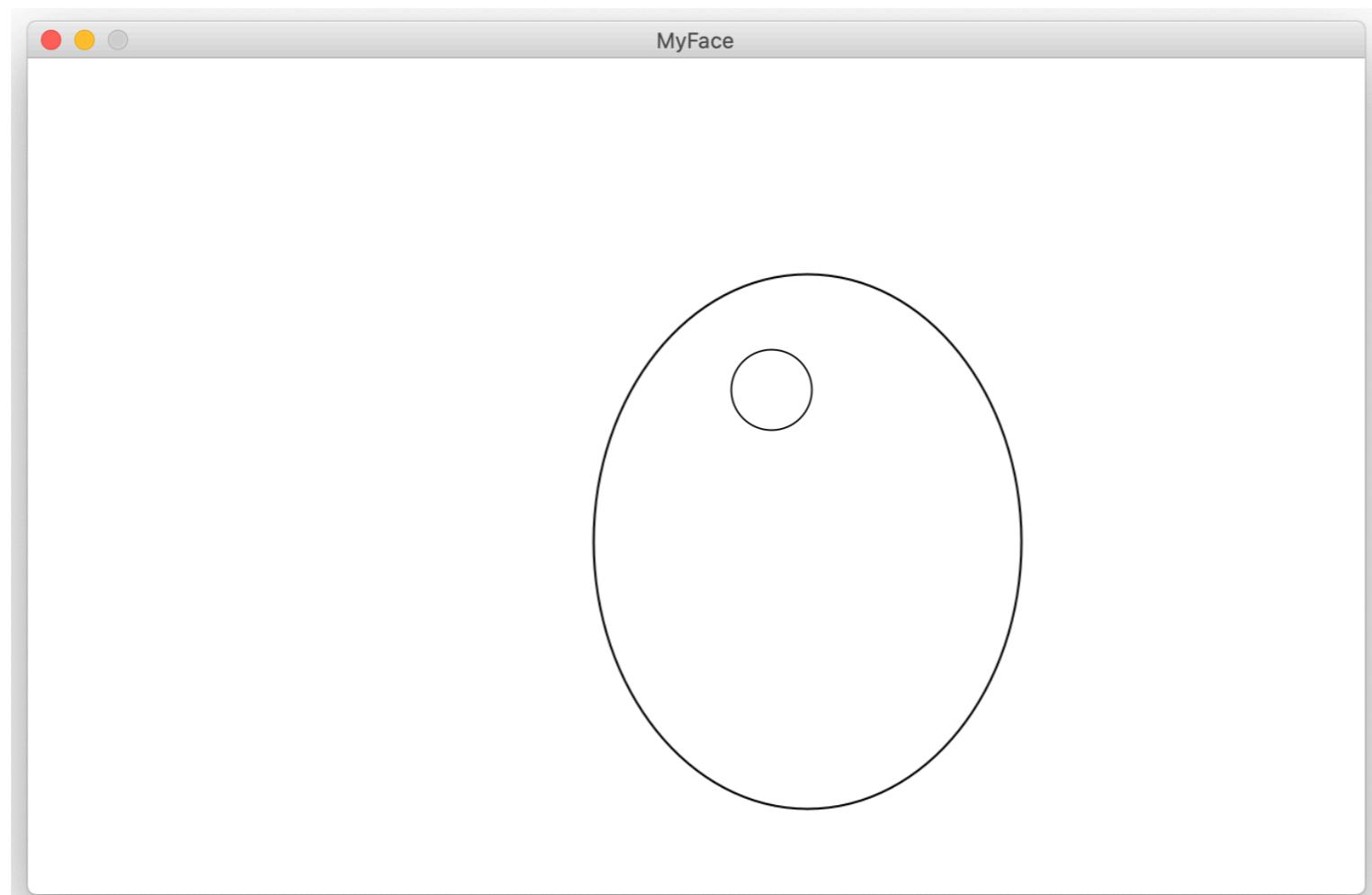
l_eye

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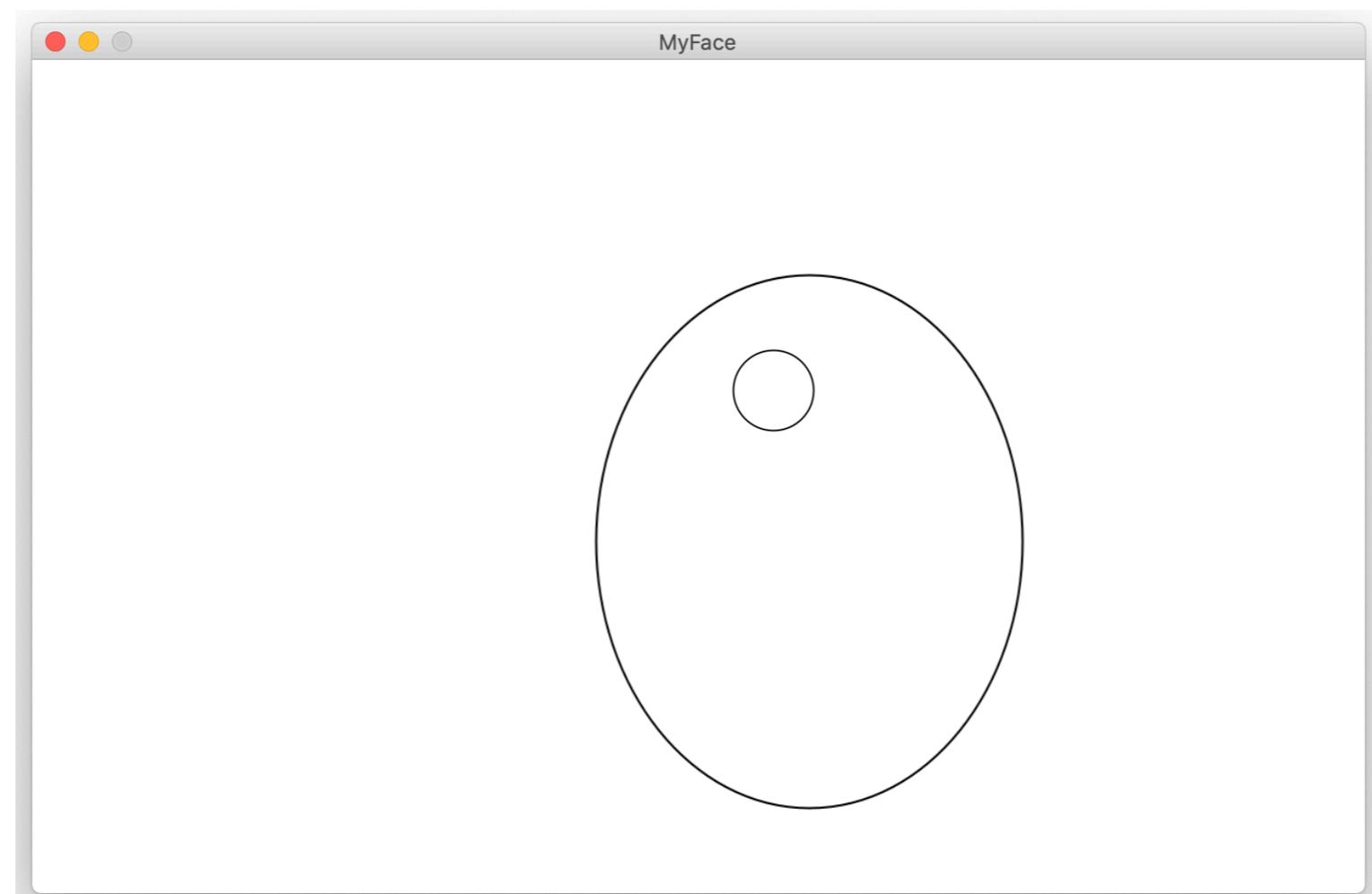
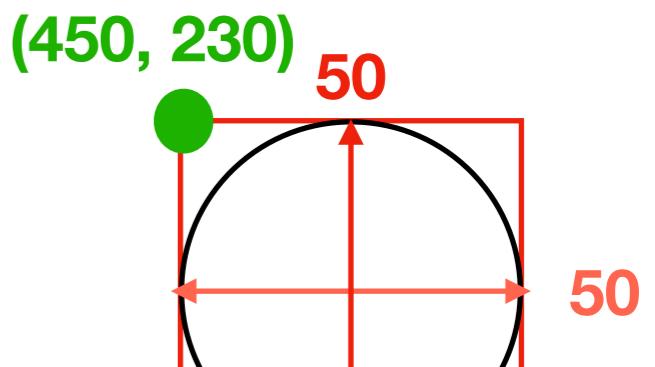


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r_eye

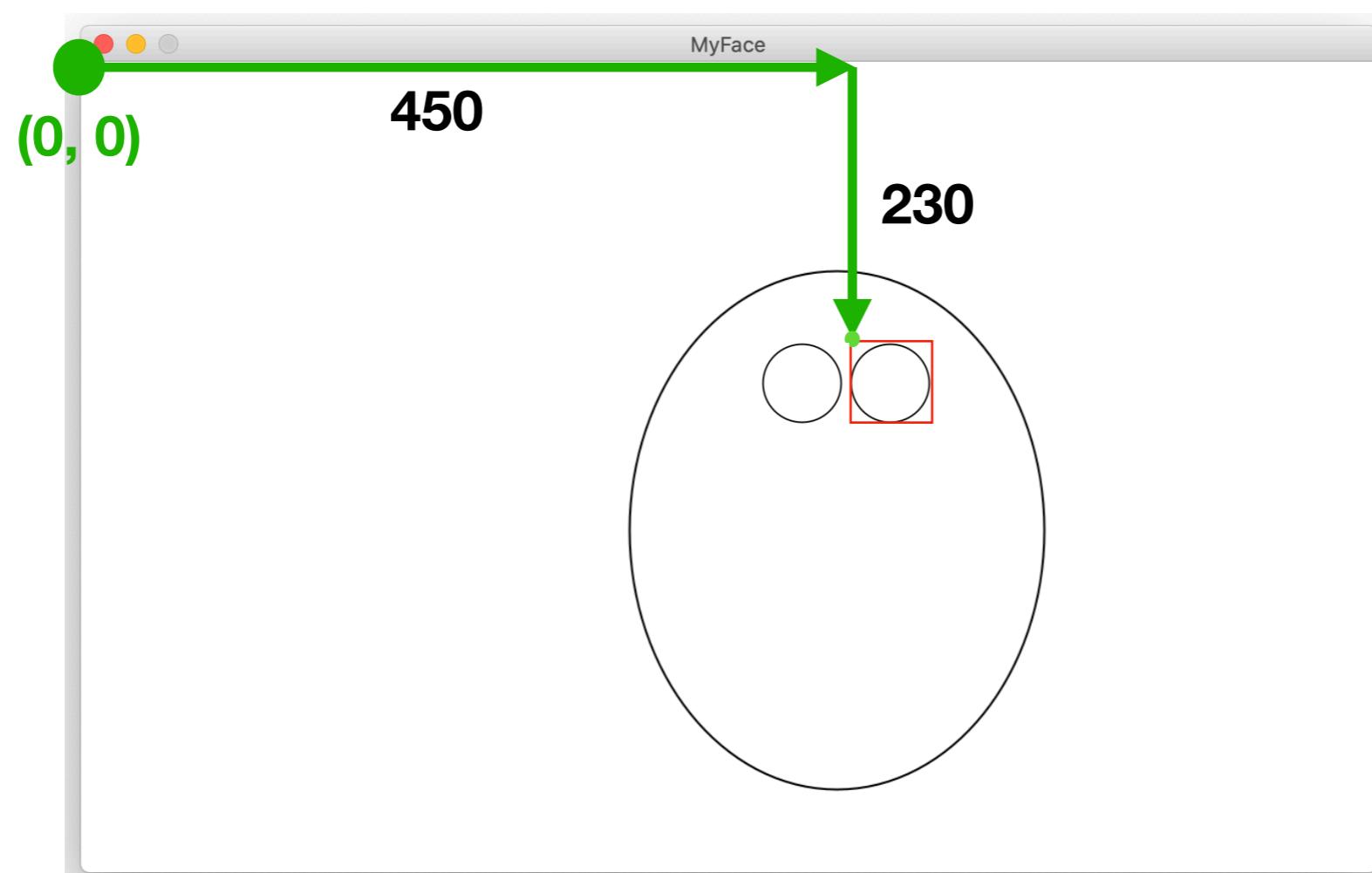
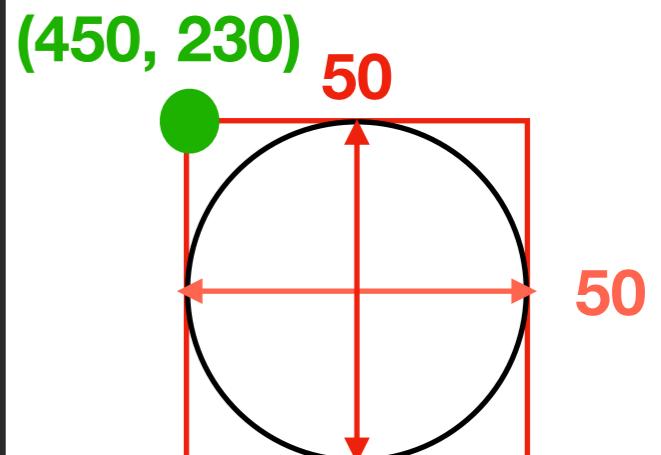


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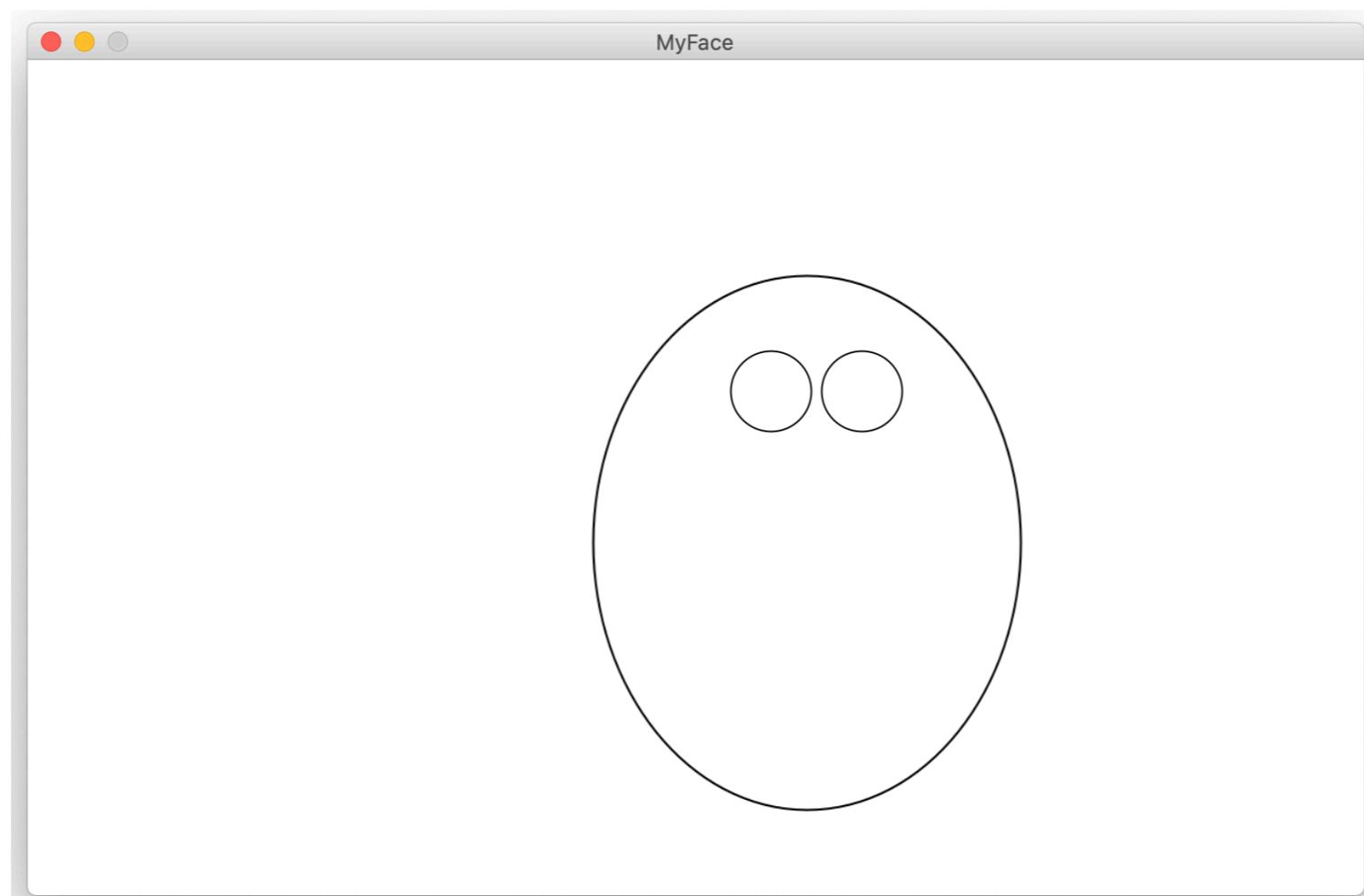
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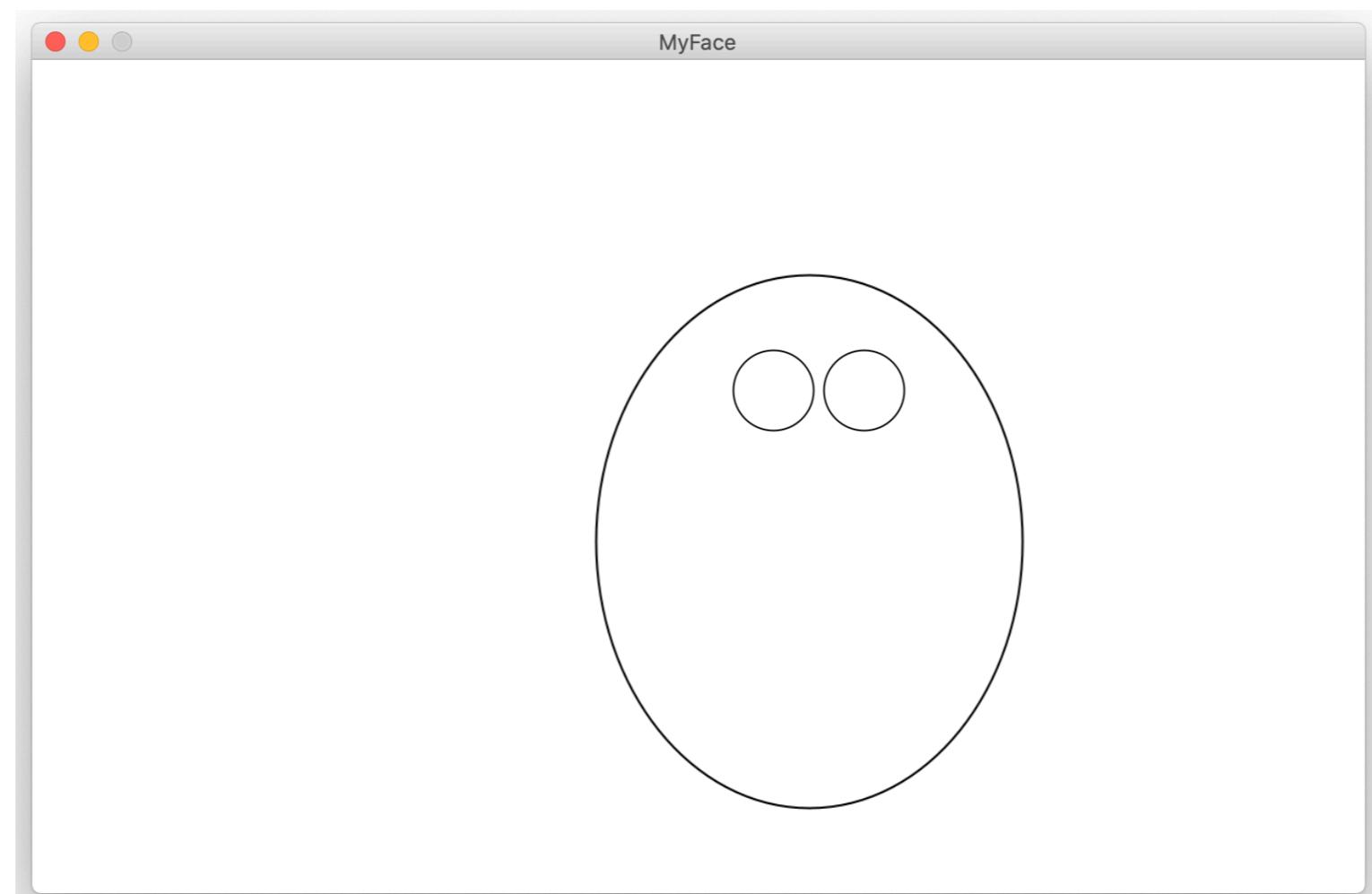
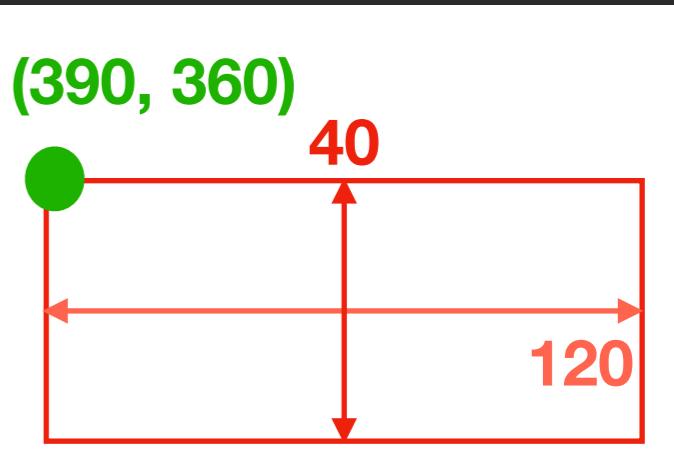
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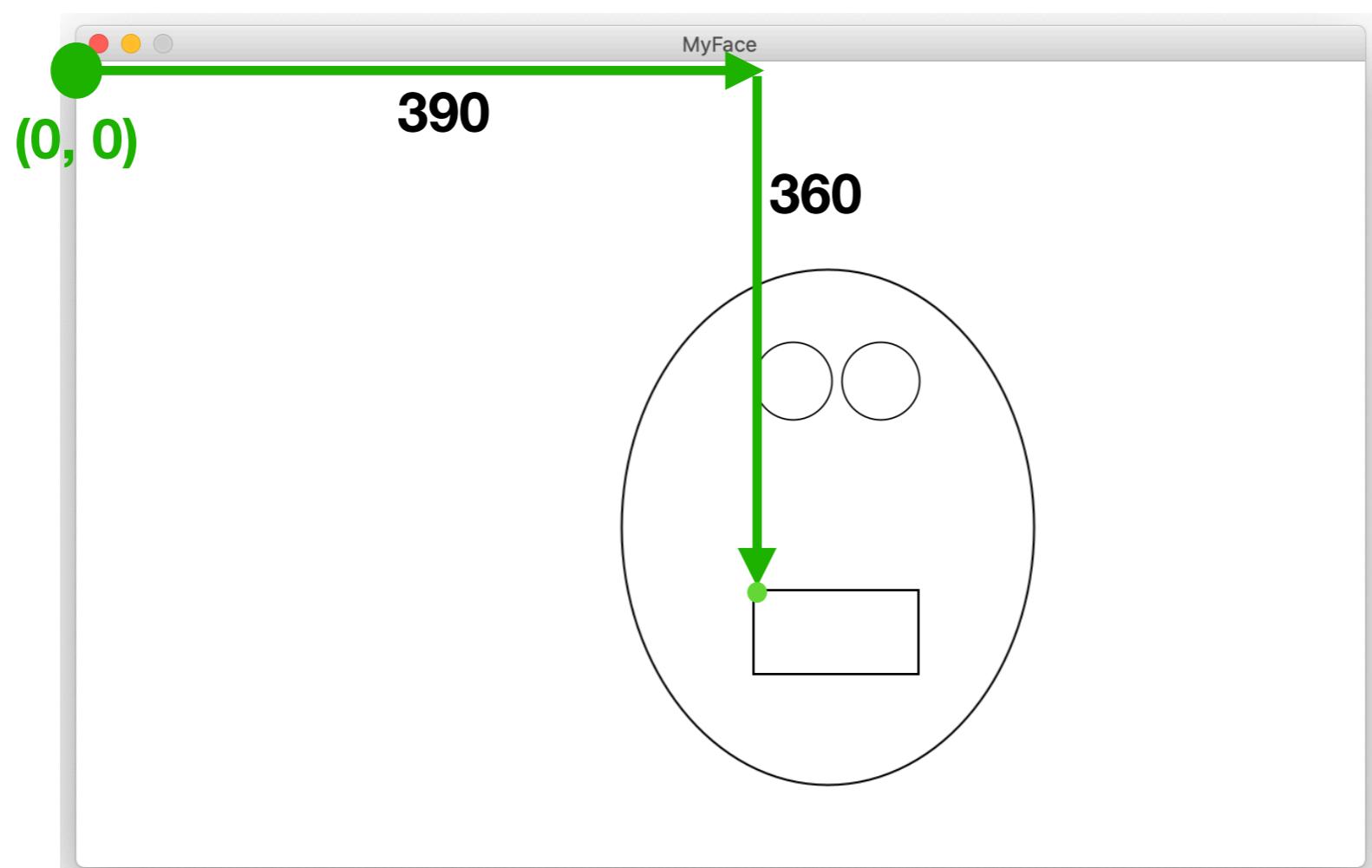
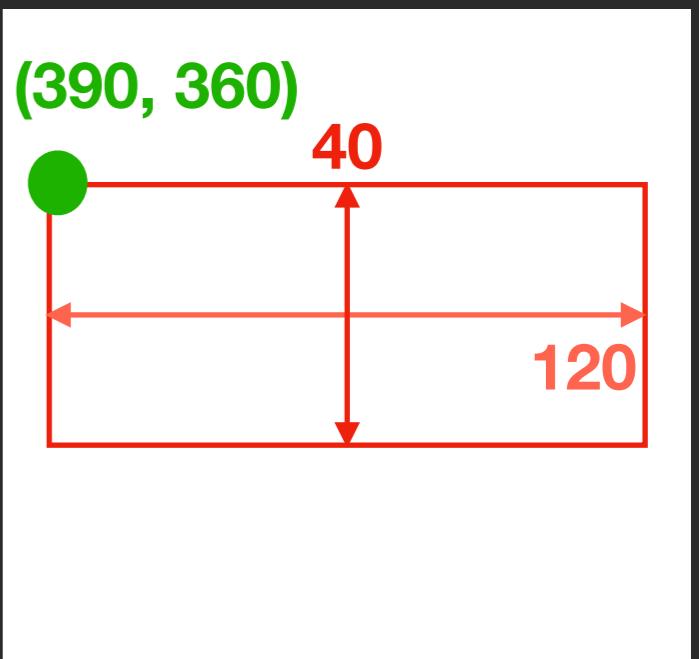


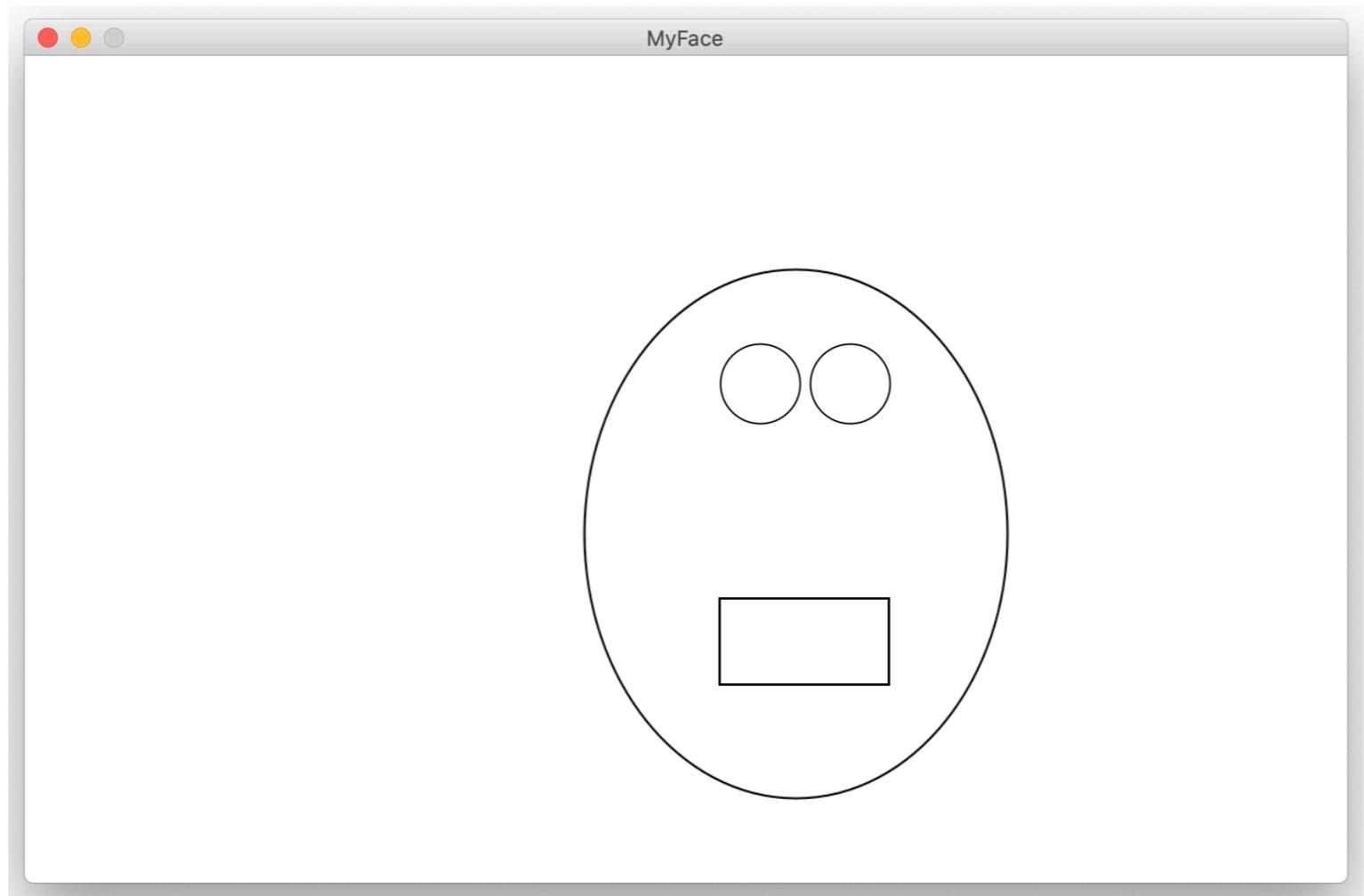
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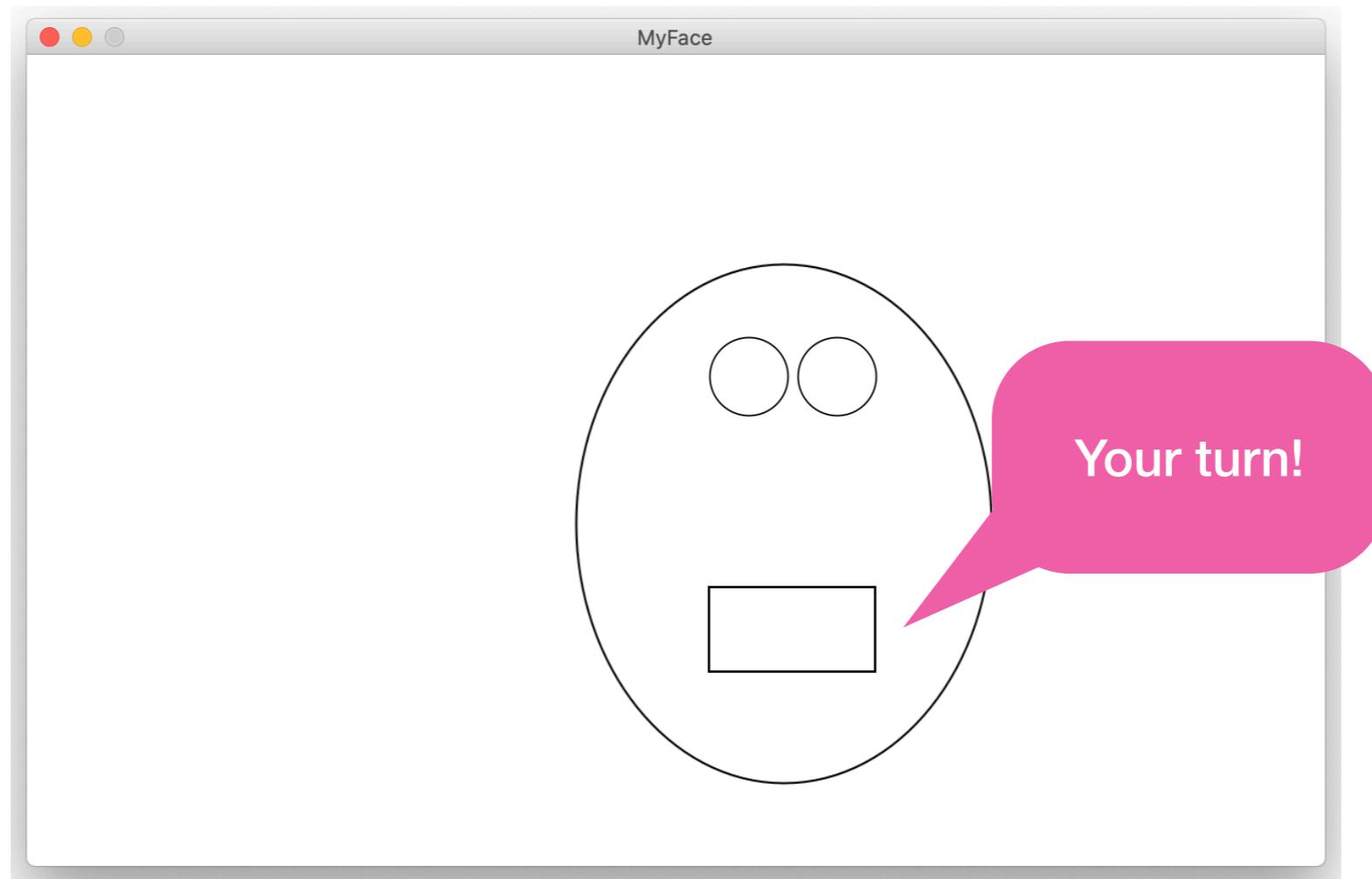
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```







- **oval = GOval(寬, 高, x=?, y=?)**

- oval.filled = True/False
- oval.fill_color = 'green'

- **oval = GOval(寬, 高, x=?, y=?)**

- oval.filled = True/False
- oval.fill_color = 'green'

- **rect = GRect(寬, 高, x=?, y=?)**

- rect.filled = True/False
- rect.fill_color = 'magenta'

- **oval = GOval(寬, 高, x=?, y=?)**

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- rect.filled = True/False
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- **label = GLabel(文字, x=?, y=?)**

- label.font = '-40'
- label.text = 'new'

- **oval = GOval(寬, 高, x=?, y=?)**
 - oval.filled = True/False
 - oval.fill_color = 'green'
- **rect = GRect(寬, 高, x=?, y=?)**
 - rect.filled = True/False
 - rect.fill_color = 'magenta'
- **label = GLabel(文字, x=?, y=?)**
 - label.font = '-40'
 - label.text = 'new'
- **myLine = GLine(起點x, 起點y, 終點x, 終點y)**

- **oval = GOval(寬, 高, x=?, y=?)**
 - oval.filled = True/False
 - oval.fill_color = 'green'
- **rect = GRect(寬, 高, x=?, y=?)**
 - rect.filled = True/False
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 - label.font = '-40'
 - label.text = 'new'
- **myLine = GLine(起點x, 起點y, 終點x, 終點y)**
- **共同擁有(Inherited from GObject)**
 - **name.width**
 - **name.height**
 - **name.x**
 - **name.y**
 - **name.color = 'magenta'**
 - **name.move(dx, dy)**

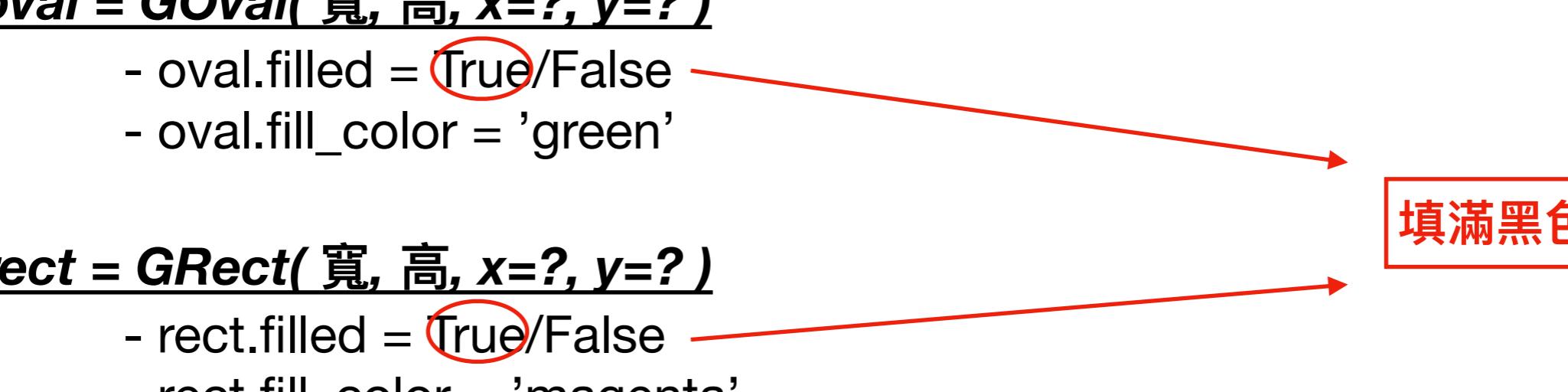
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 - name.width
 - name.height
 - name.x
 - name.y
 - name.color = 'magenta'
 - name.move(dx, dy)

改變邊框顏色

- **oval = GOval(寬, 高, x=? , y=?)**

- oval.filled = True/False

- oval.fill_color = 'green'



填滿黑色

- **rect = GRect(寬, 高, x=? , y=?)**

- rect.filled = True/False

- rect.fill_color = 'magenta'

- **label = GLabel(文字, x=? , y=?)**

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- label.text = 'new'

- **myLine = GLine(起點x, 起點y, 終點x, 終點y)**

- **共同擁有(Inherited from GObject)**

- name.width

- name.height

- name.x

- name.y

- name.color = 'magenta'

- name.move(dx, dy)

- **oval = GOval(寬, 高, x=?, y=?)**

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填滿顏色

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- rect.filled = True/False

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- **label = GLabel(文字, x=?, y=?)**

- label.font = '-40'

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- **myLine = GLine(起點x, 起點y, 終點x, 終點y)**

- **共同擁有(Inherited from GObject)**

- name.width

- name.height

- name.x

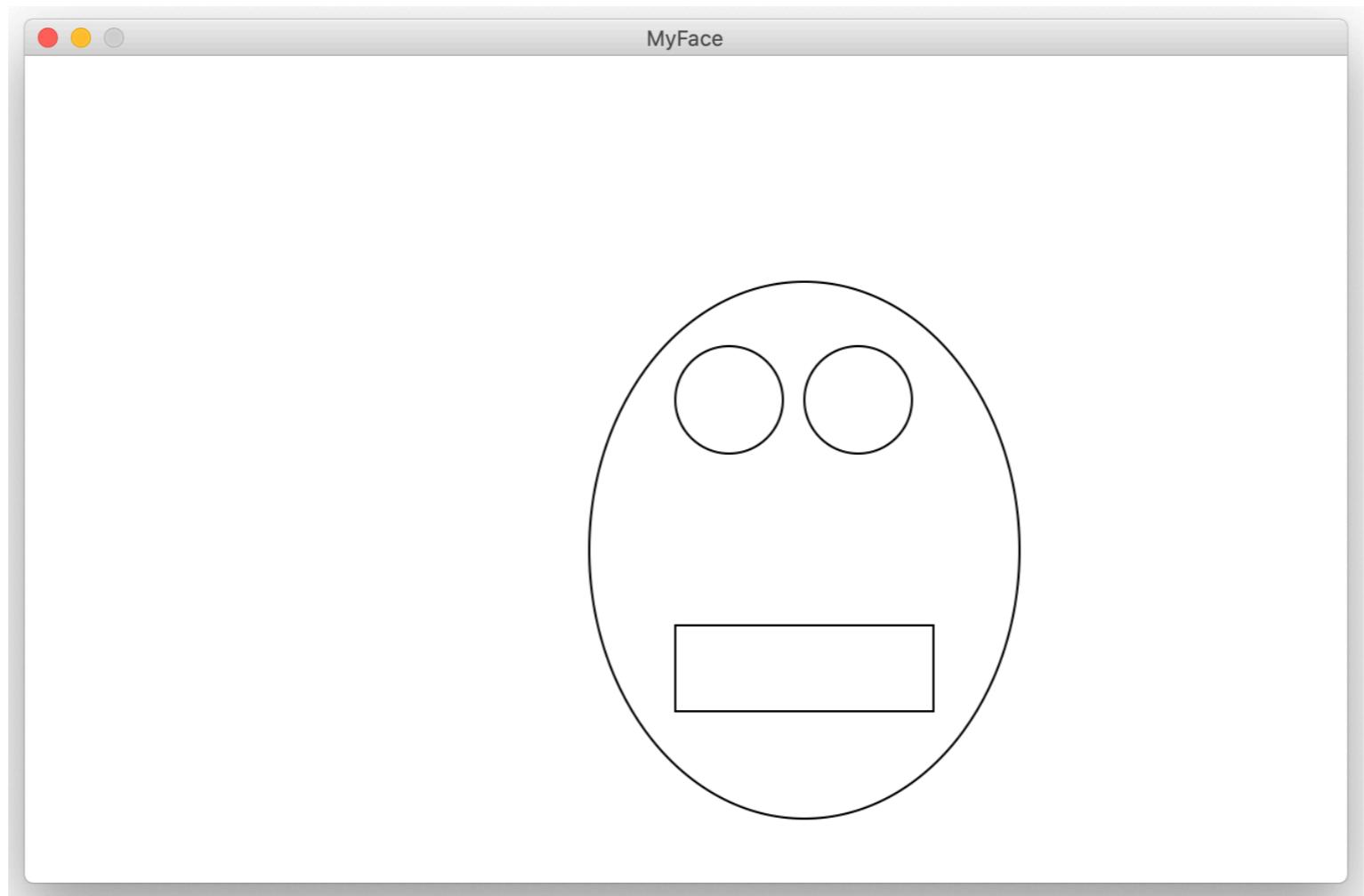
- name.y

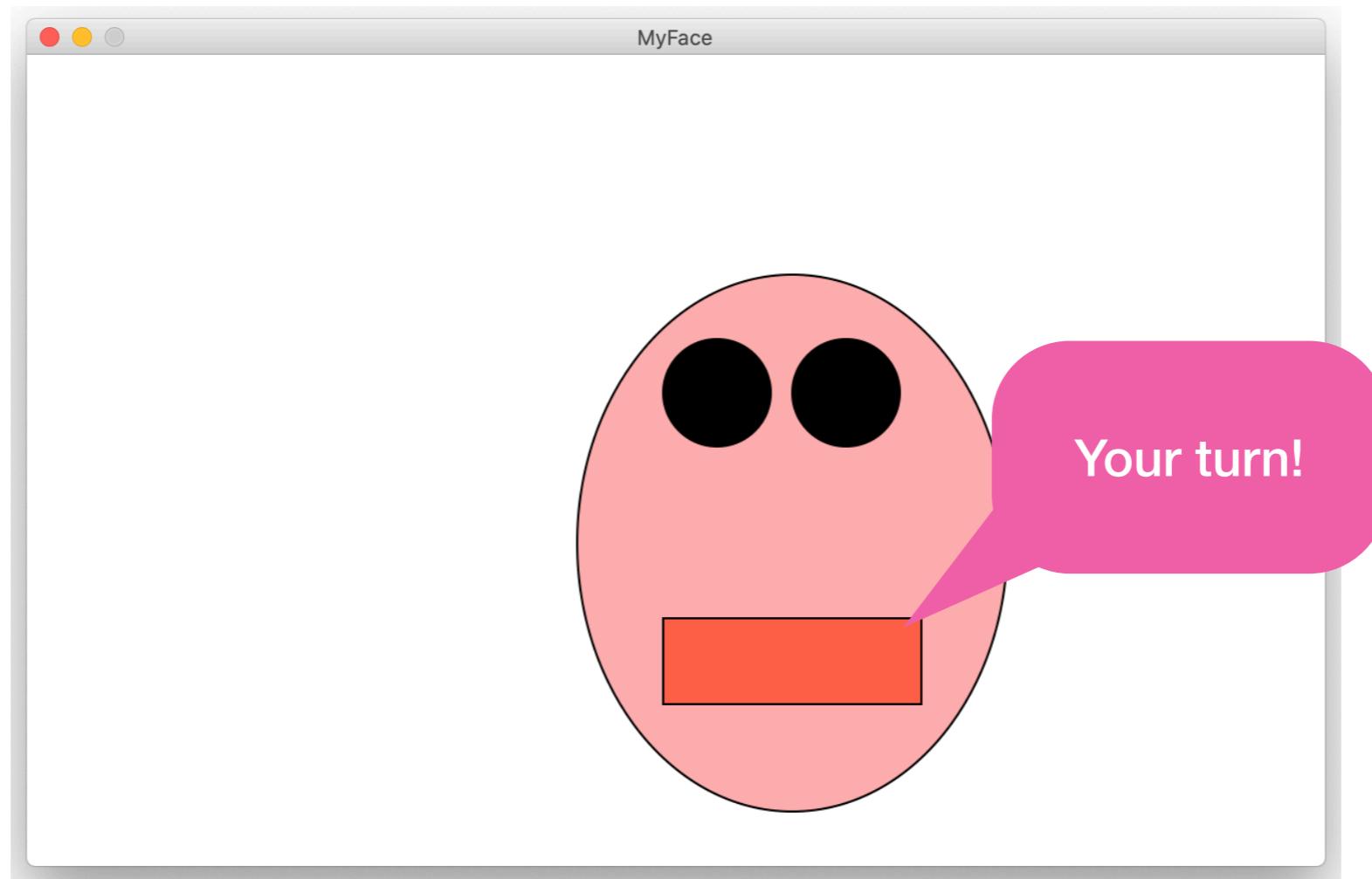
- name.color = 'magenta'

- name.move(dx, dy)

color 選項

| | | | | |
|---------------------|------------------------|-------------------|------------------|--------------------|
| 'aliceblue' | 'antiquewhite' | 'aqua' | 'aquamarine' | 'azure' |
| 'beige' | 'bisque' | 'black' | 'blanchedalmond' | 'blue' |
| 'blueviolet' | 'brown' | 'burlywood' | 'cadetblue' | 'chartreuse' |
| 'chocolate' | 'coral' | 'cornflowerblue' | 'cornsilk' | 'crimson' |
| 'cyan' | 'darkblue' | 'darkcyan' | 'darkgoldenrod' | 'darkgray' |
| 'darkgreen' | 'darkgrey' | 'darkkhaki' | 'darkmagenta' | 'darkolivegreen' |
| 'darkorange' | 'darkorchid' | 'darkred' | 'darksage' | 'darksalmon' |
| 'darkseagreen' | 'darkslateblue' | 'darkslategray' | 'darkslategrey' | 'darkturquoise' |
| 'darkviolet' | 'deeppink' | 'deepskyblue' | 'dimgray' | 'dimgrey' |
| 'dodgerblue' | 'firebrick' | 'floralwhite' | 'forestgreen' | 'fuchsia' |
| 'gainsboro' | 'ghostwhite' | 'gold' | 'goldenrod' | 'gray' |
| 'green' | 'greenyellow' | 'grey' | 'honeydew' | 'hotpink' |
| 'indianred' | 'indigo' | 'ivory' | 'khaki' | 'lavender' |
| 'lavenderblush' | 'lawngreen' | 'lemonchiffon' | 'lightblue' | 'lightcoral' |
| 'lightcyan' | 'lightgoldenrodyellow' | 'lightgray' | 'lightgreen' | 'lightgrey' |
| 'lightpink' | 'lightsage' | 'lightsalmon' | 'lightseagreen' | 'lightskyblue' |
| 'lightslategray' | 'lightslategrey' | 'lightsteelblue' | 'lightyellow' | 'lime' |
| 'limegreen' | 'linen' | 'magenta' | 'maroon' | 'mediumaquamarine' |
| 'mediumblue' | 'mediumorchid' | 'mediumpurple' | 'mediumseagreen' | 'mediumslateblue' |
| 'mediumspringgreen' | 'mediumturquoise' | 'mediumvioletred' | 'midnightblue' | 'mintcream' |
| 'mistyrose' | 'moccasin' | 'navajowhite' | 'navy' | 'oldlace' |
| 'olive' | 'olivedrab' | 'orange' | 'orangered' | 'orchid' |
| 'palegoldenrod' | 'palegreen' | 'paleturquoise' | 'palevioletred' | 'papayawhip' |
| 'peachpuff' | 'peru' | 'pink' | 'plum' | 'powderblue' |
| 'purple' | 'red' | 'rosybrown' | 'royalblue' | 'saddlebrown' |
| 'sage' | 'salmon' | 'sandybrown' | 'seagreen' | 'seashell' |
| 'sienna' | 'silver' | 'skyblue' | 'slateblue' | 'slategray' |
| 'slategrey' | 'snow' | 'springgreen' | 'steelblue' | 'tan' |
| 'teal' | 'thistle' | 'tomato' | 'turquoise' | 'violet' |
| 'wheat' | 'white' | 'whitesmoke' | 'yellow' | 'yellowgreen' |





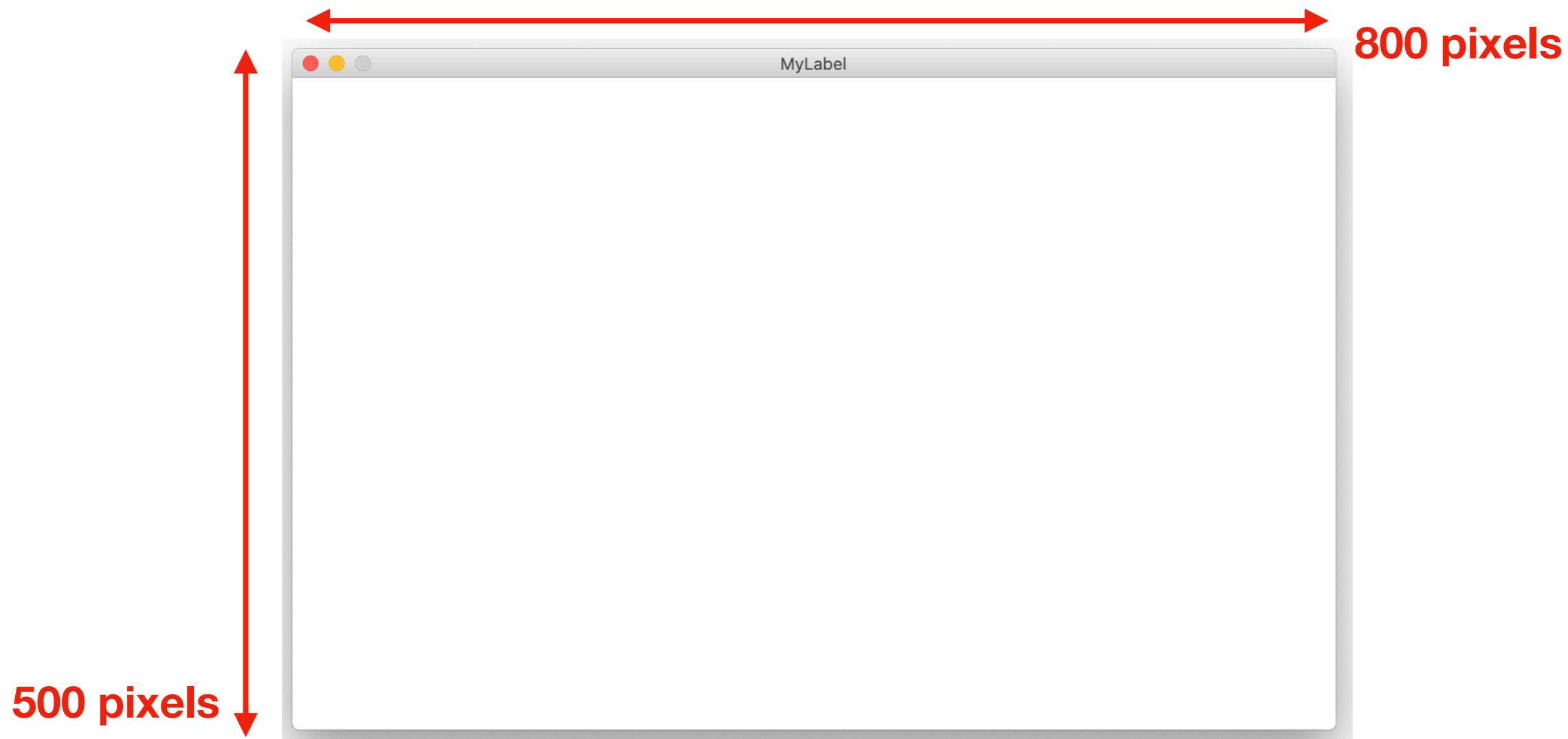
GLabel

```
from campy.graphics.gobjects import GLabel
from campy.graphics.gwindow import GWindow

def main():
    window = GWindow(width=800, height=500, title='MyLabel')
    label = GLabel('Hello, world!')
    label.font = '-80'
    label.color = 'magenta'
    window.add(label, 100, 200)
```

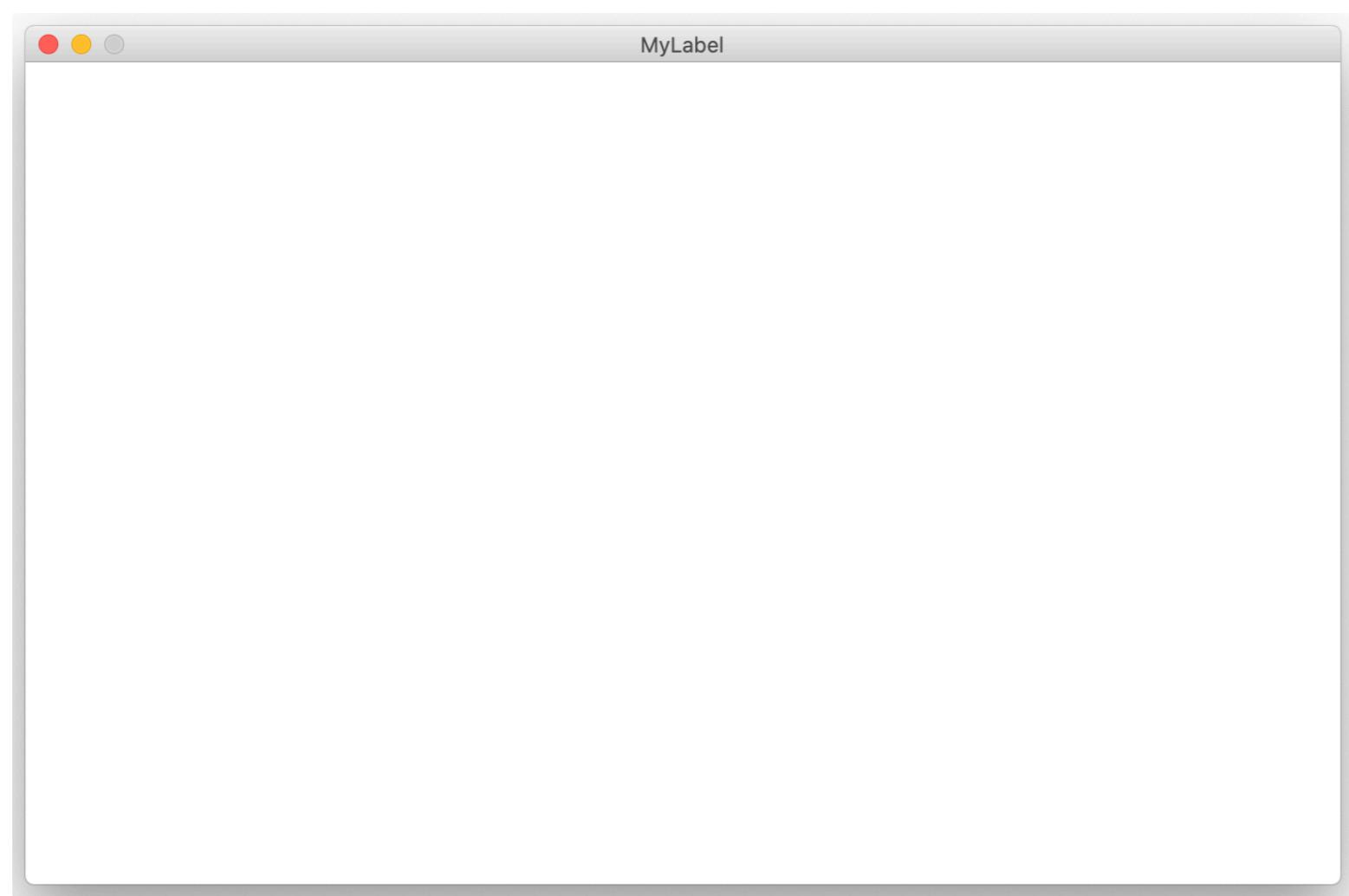
```
from campy.graphics.gobjects import GLabel
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def main():
    window = GWindow(width=800, height=500, title='MyLabel')
    label = GLabel('Hello, world!')
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    label.color = 'magenta'
    window.add(label, 100, 200)
```



```
from campy.graphics.gobjects import GLabel  
from campy.graphics.gwindow import GWindow  
  
def main():  
    window = GWindow(width=800, height=500, title='MyLabel')  
    label = GLabel('Hello, world!')  
    label.font = '-80'  
    label.color = 'magenta'  
    window.add(label, 100, 200)
```

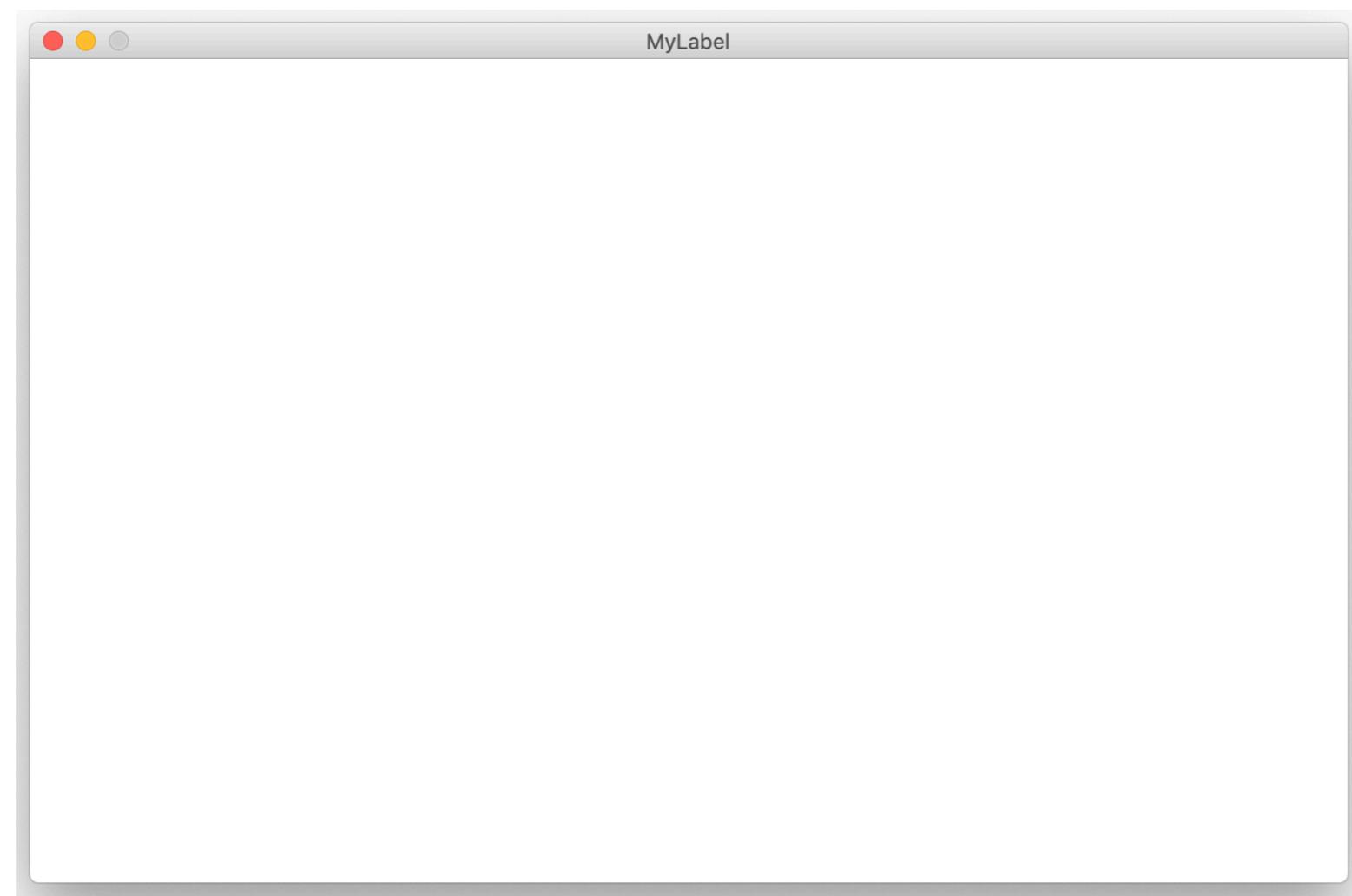
label



```
from campy.graphics.gobjects import GLabel  
from campy.graphics.gwindow import GWindow  
  
def main():  
    window = GWindow(width=800, height=500, title='MyLabel')  
    label = GLabel('Hello, world!')  
    label.font = '-80'  
    label.color = 'magenta'  
    window.add(label, 100, 200)
```

label

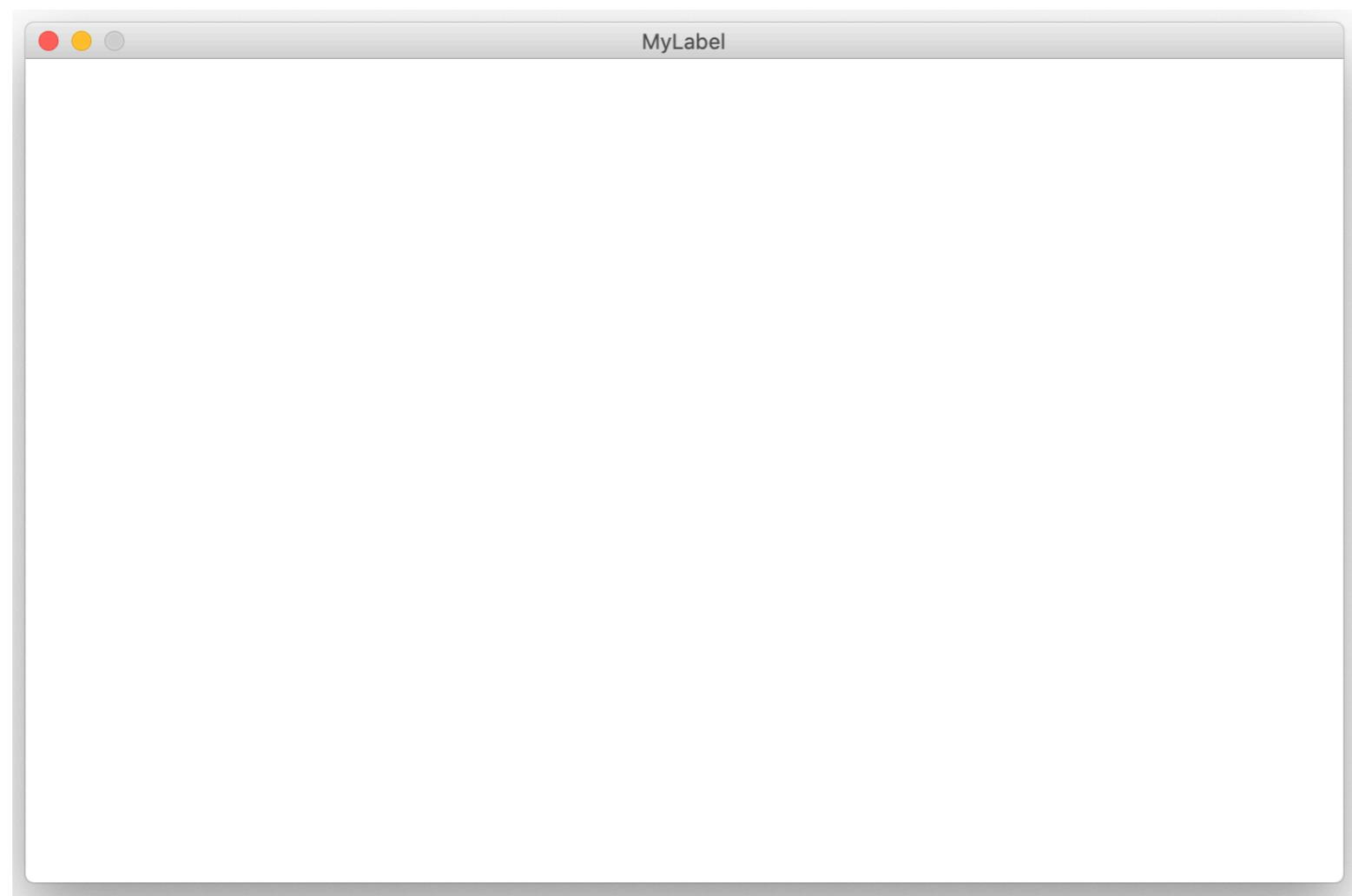
Hello, world!



```
from campy.graphics.gobjects import GLabel  
from campy.graphics.gwindow import GWindow  
  
def main():  
    window = GWindow(width=800, height=500, title='MyLabel')  
    label = GLabel('Hello, world!')  
    label.font = '-80'  
    label.color = 'magenta'  
    window.add(label, 100, 200)
```

label

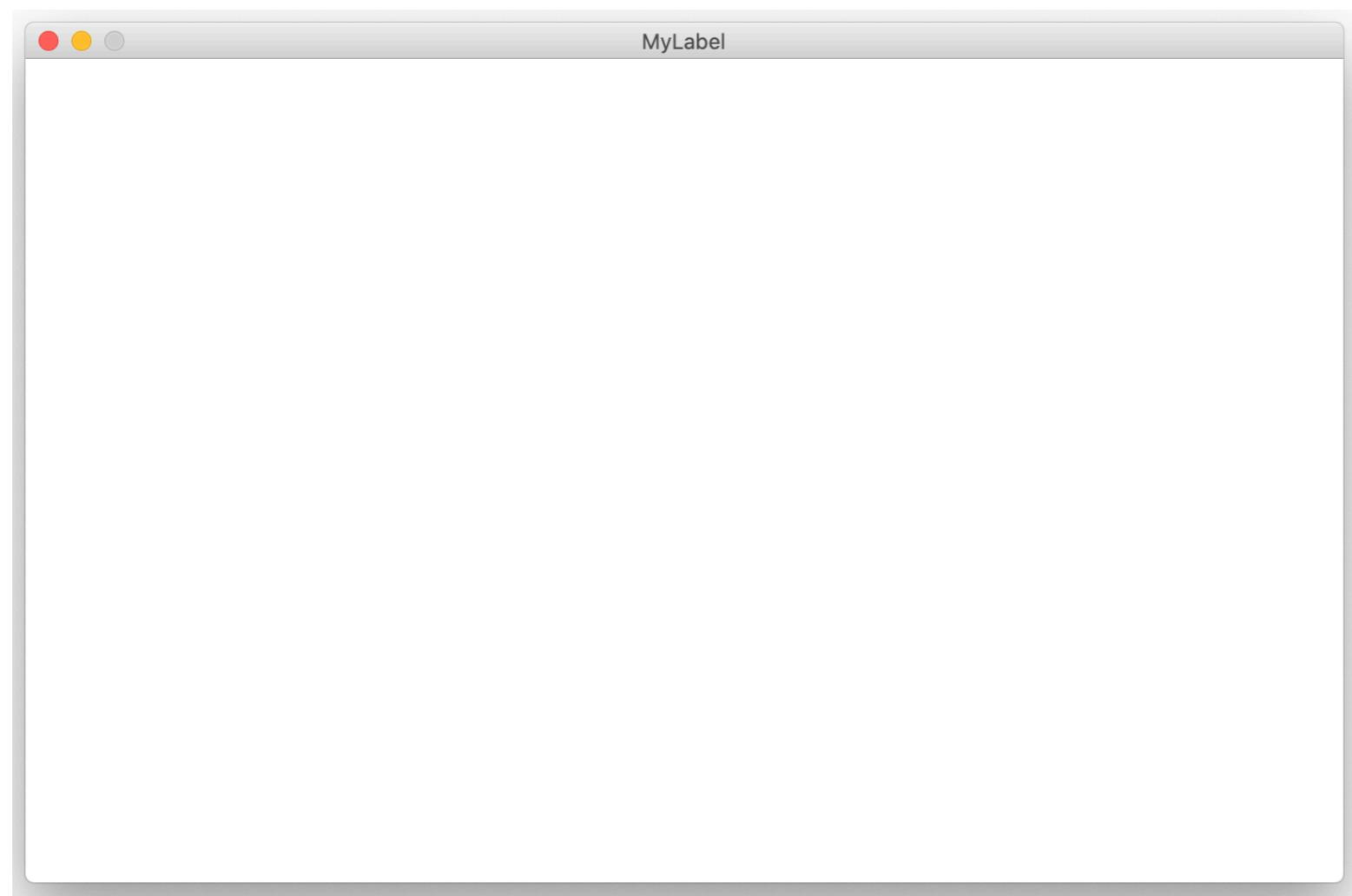
Hello, world!



```
from campy.graphics.gobjects import GLabel  
from campy.graphics.gwindow import GWindow  
  
def main():  
    window = GWindow(width=800, height=500, title='MyLabel')  
    label = GLabel('Hello, world!')  
    label.font = '-80'  
    label.color = 'magenta'  
    window.add(label, 100, 200)
```

label

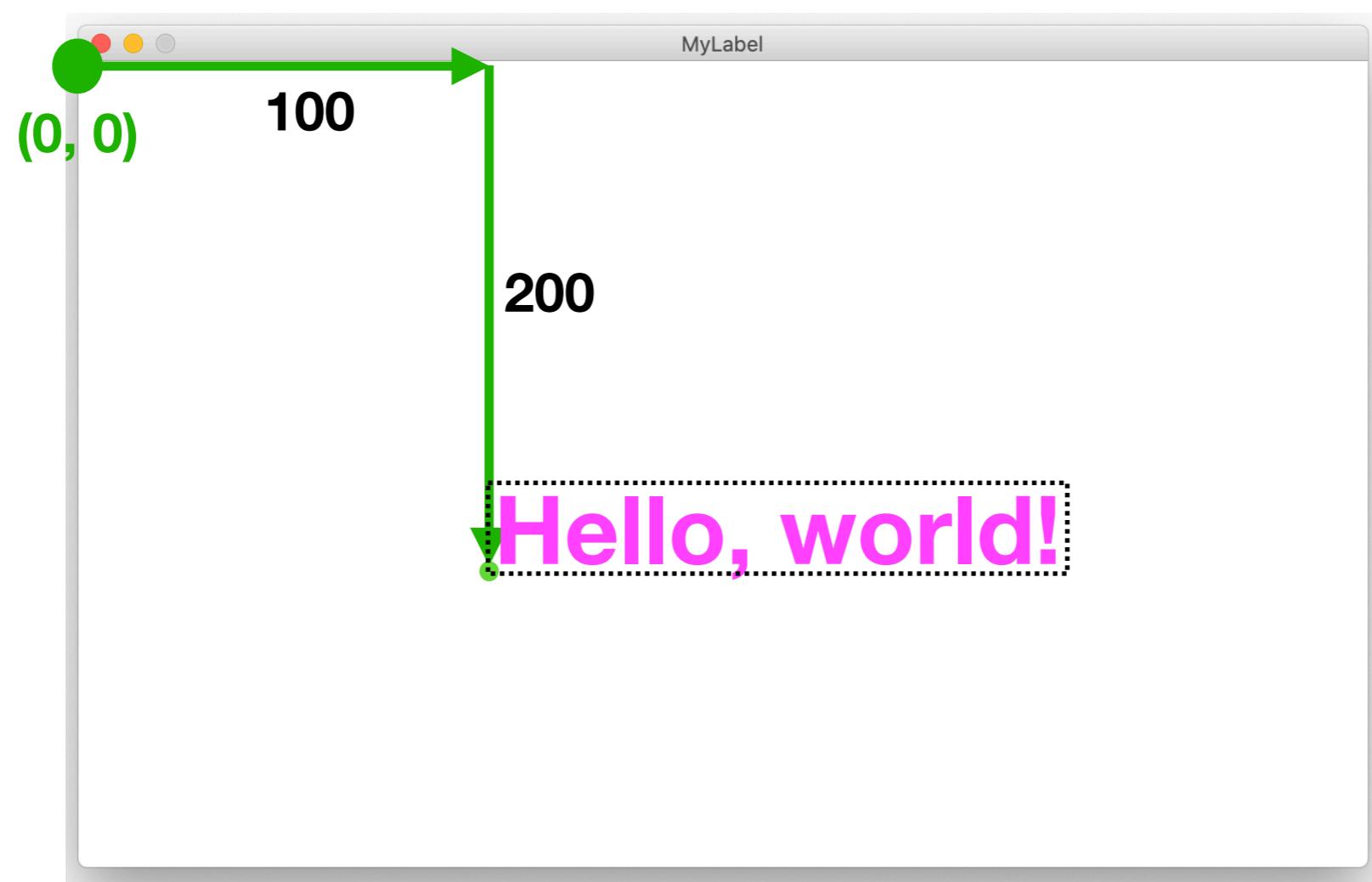
Hello, world!

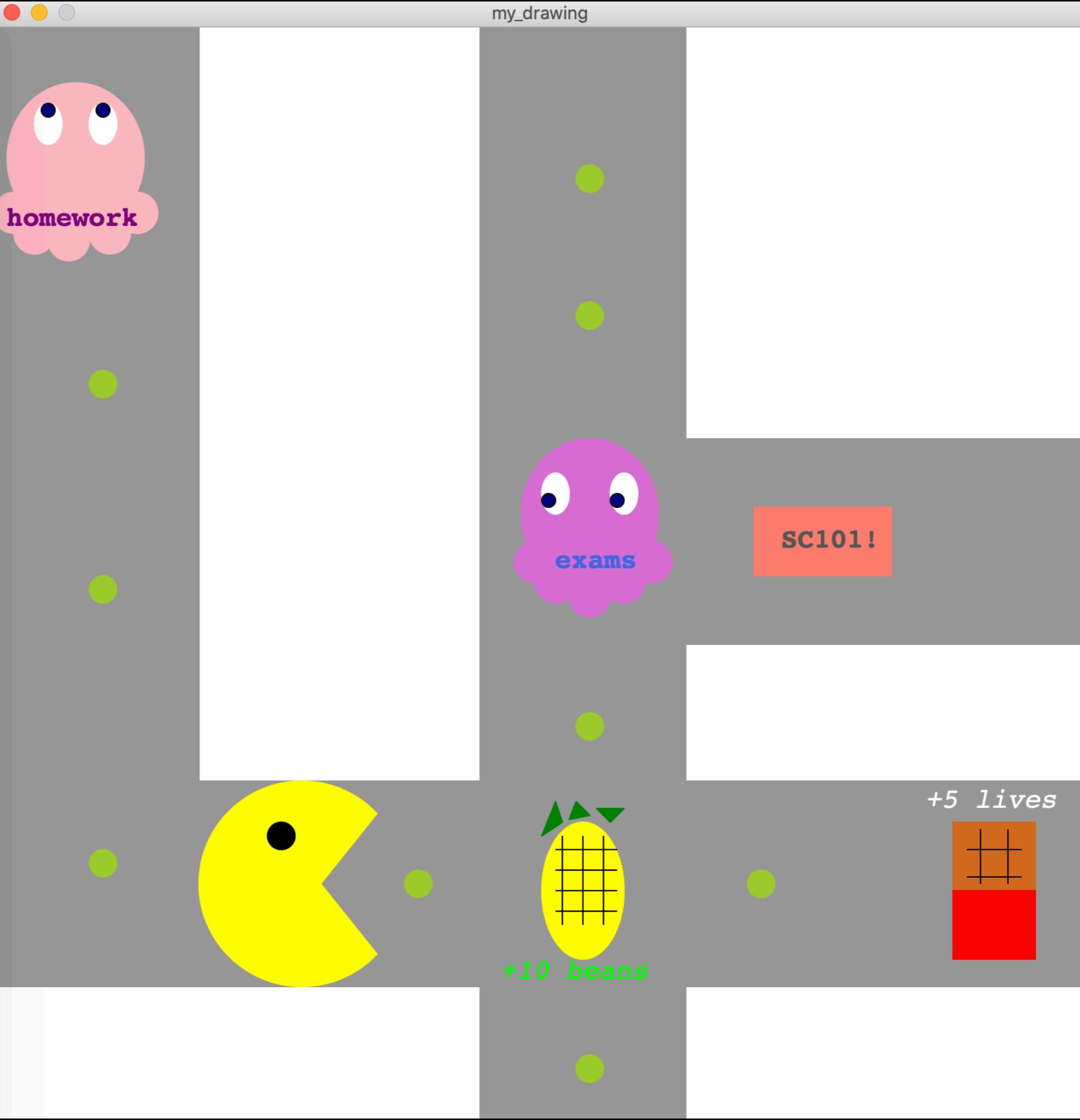


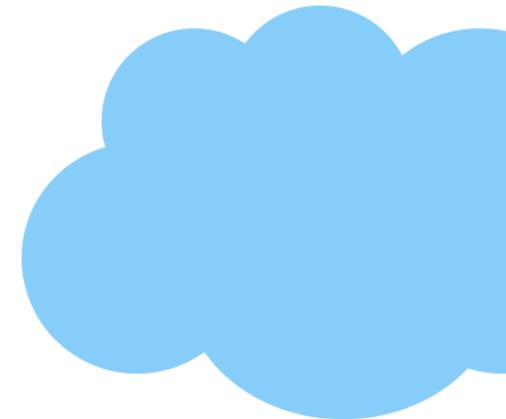
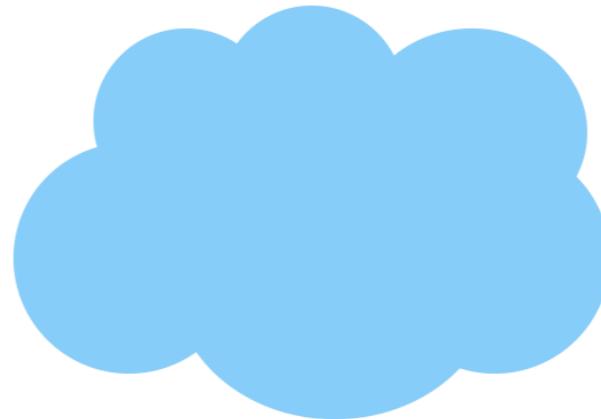
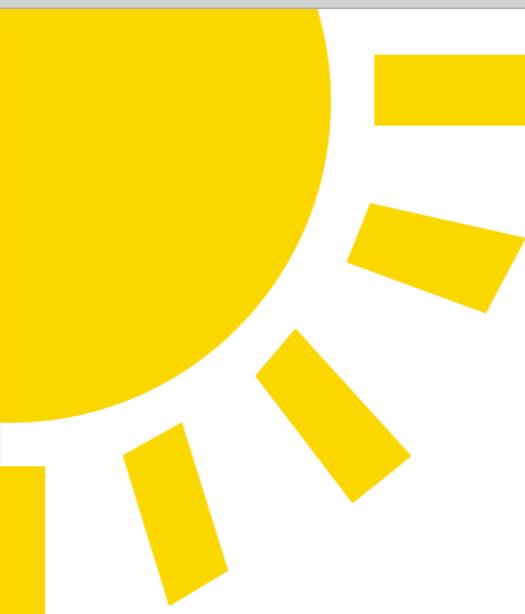
```
from campy.graphics.gobjects import GLabel  
from campy.graphics.gwindow import GWindow  
  
def main():  
    window = GWindow(width=800, height=500, title='MyLabel')  
    label = GLabel('Hello, world!')  
    label.font = '-80'  
    label.color = 'magenta'  
    window.add(label, 100, 200)
```

label

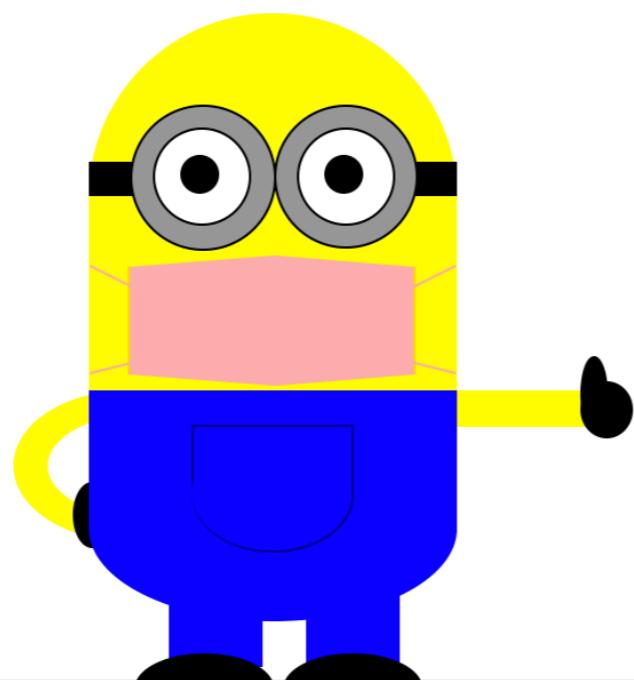
Hello, world!







**stanCode
SC101**



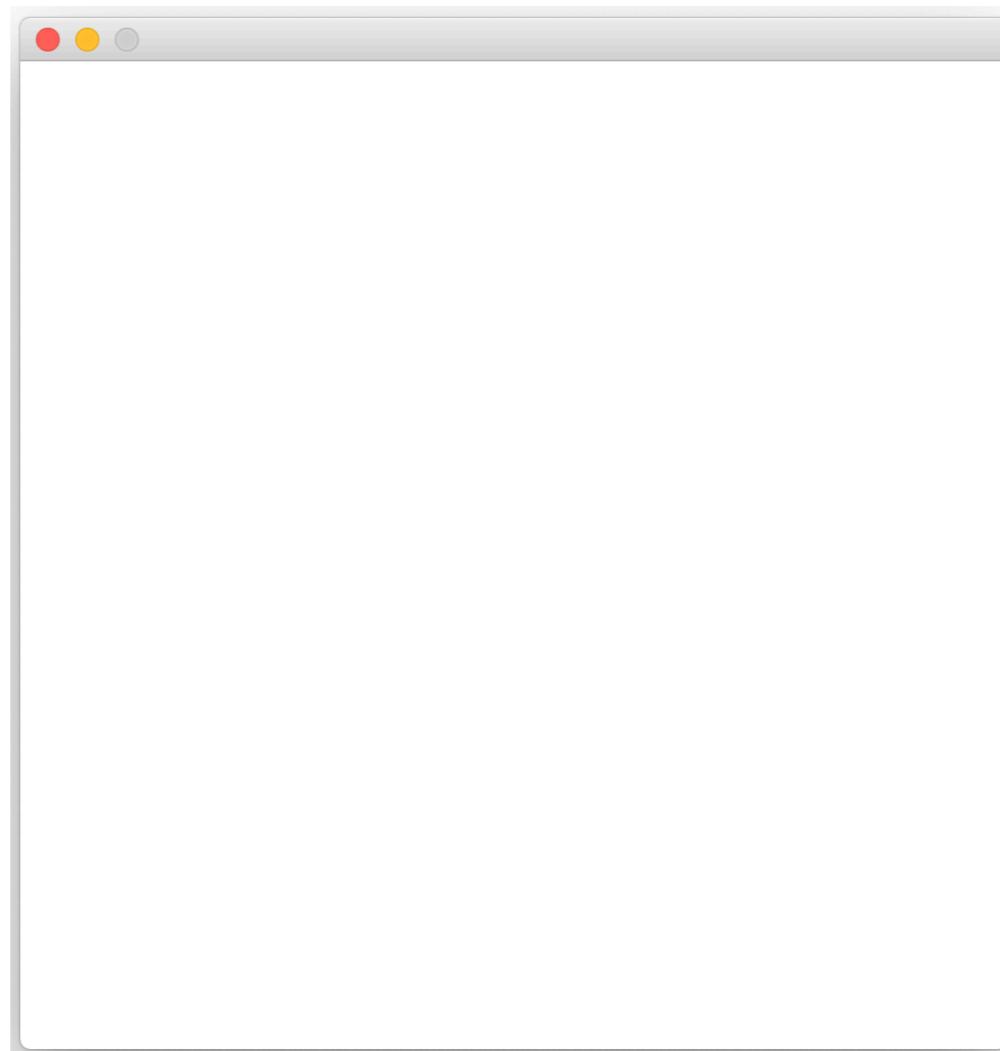
#May2020 #Taiwan

Animation

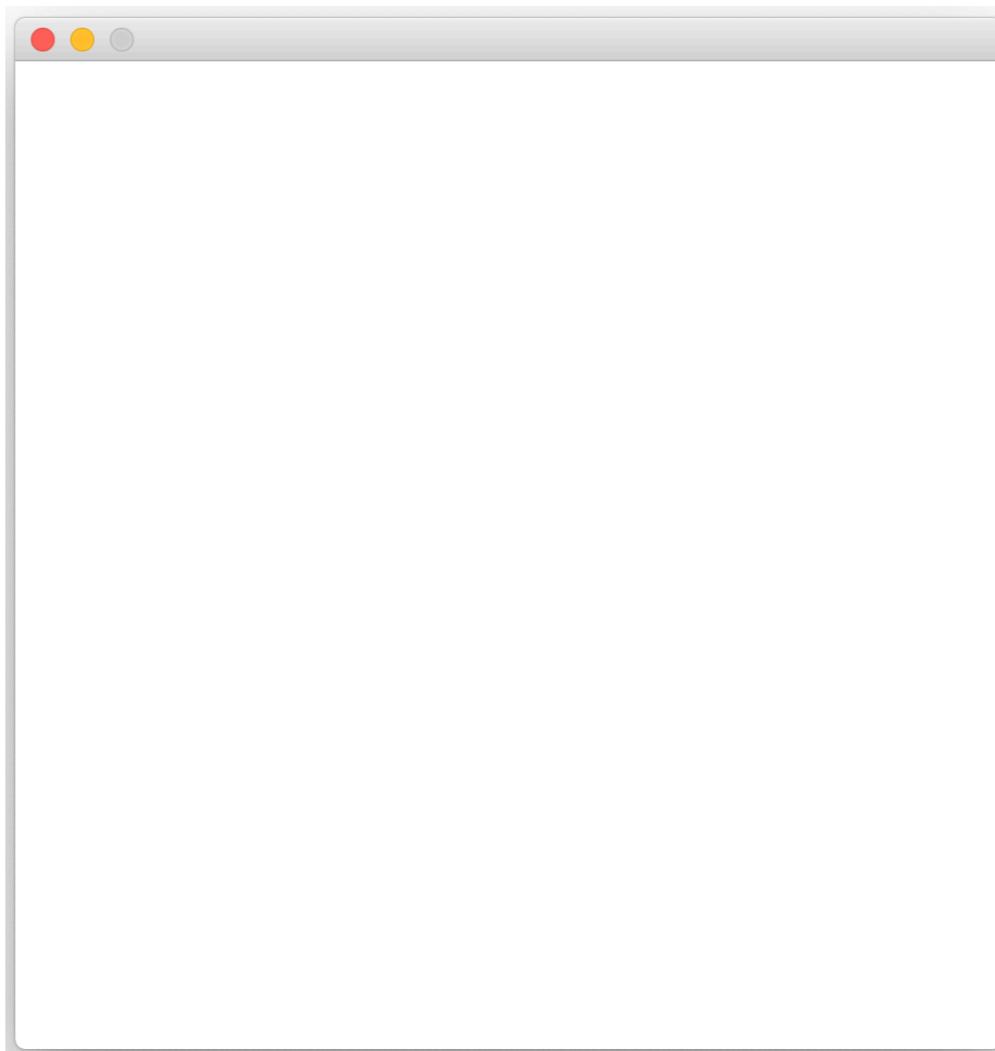
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```

```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```

```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```

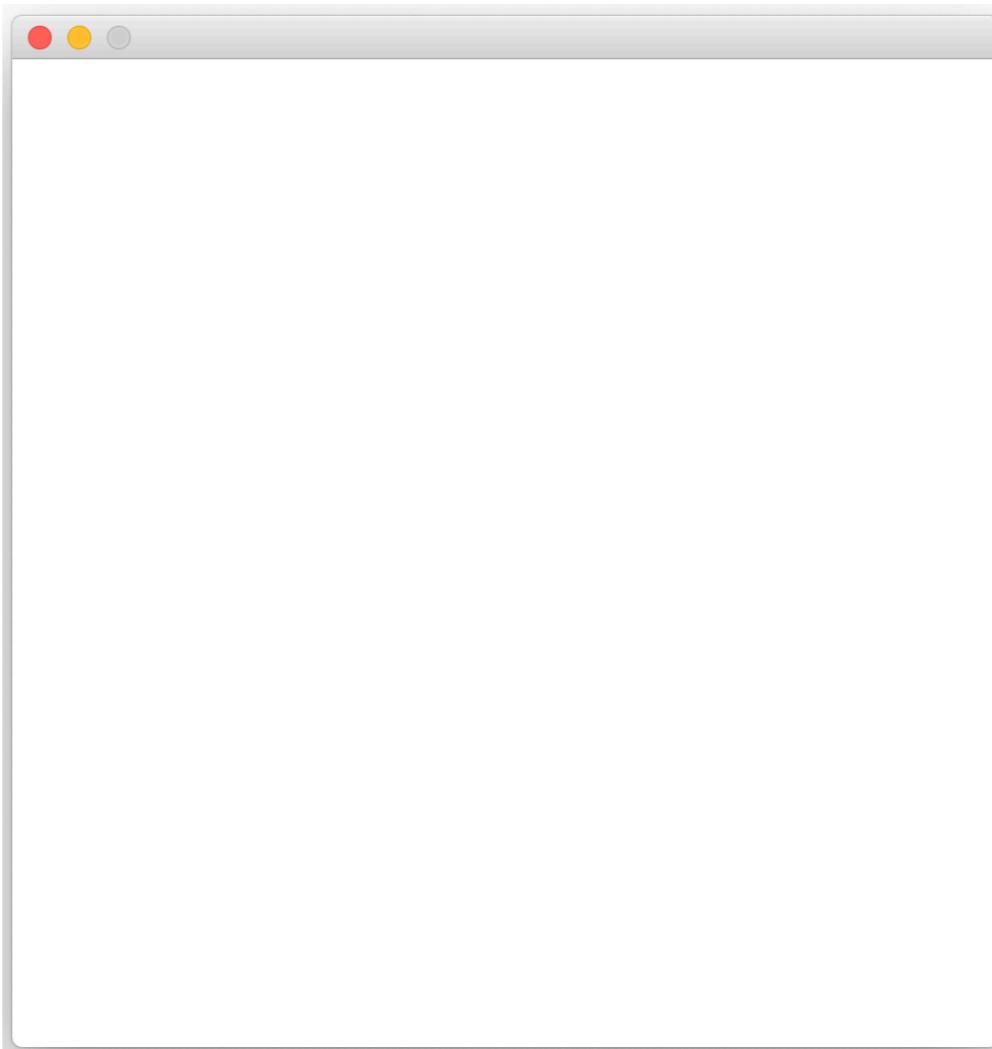


```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



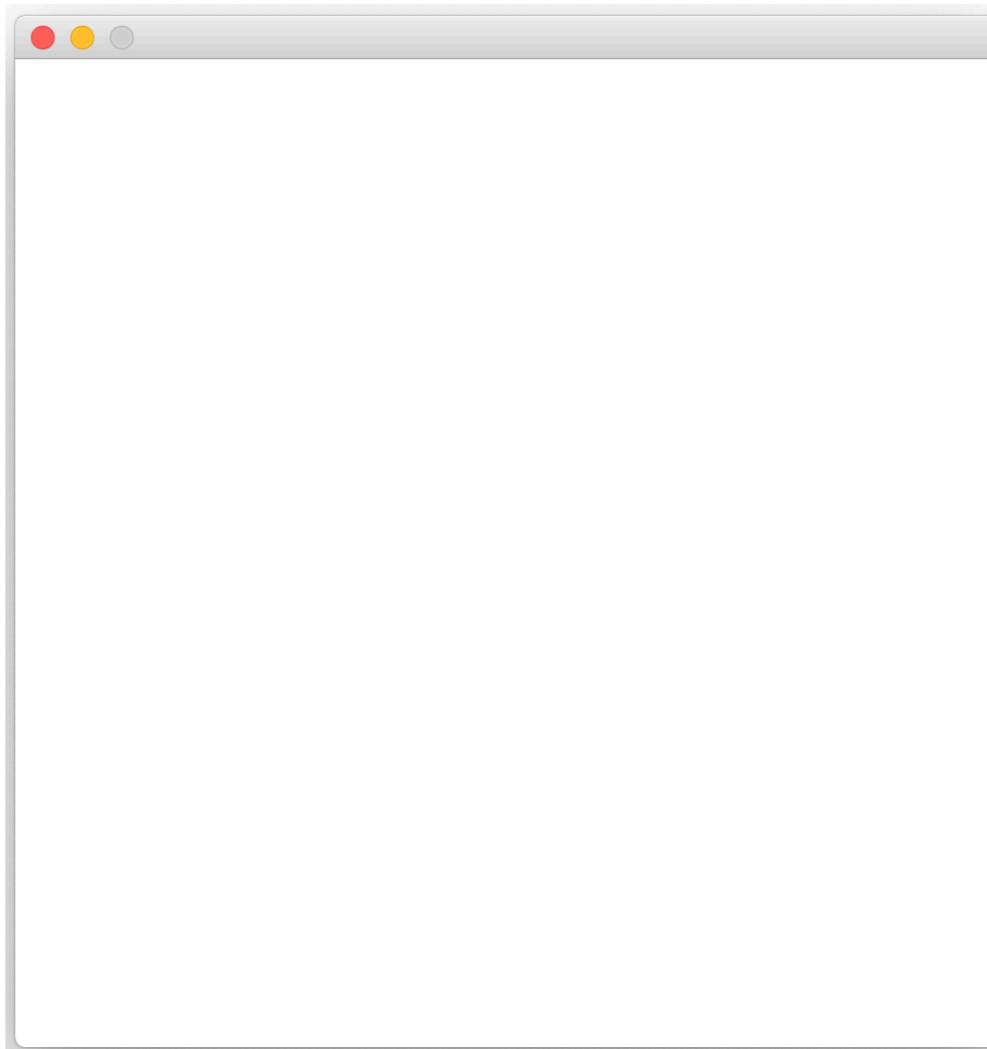
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```

SIZE
**SIZE**
rect

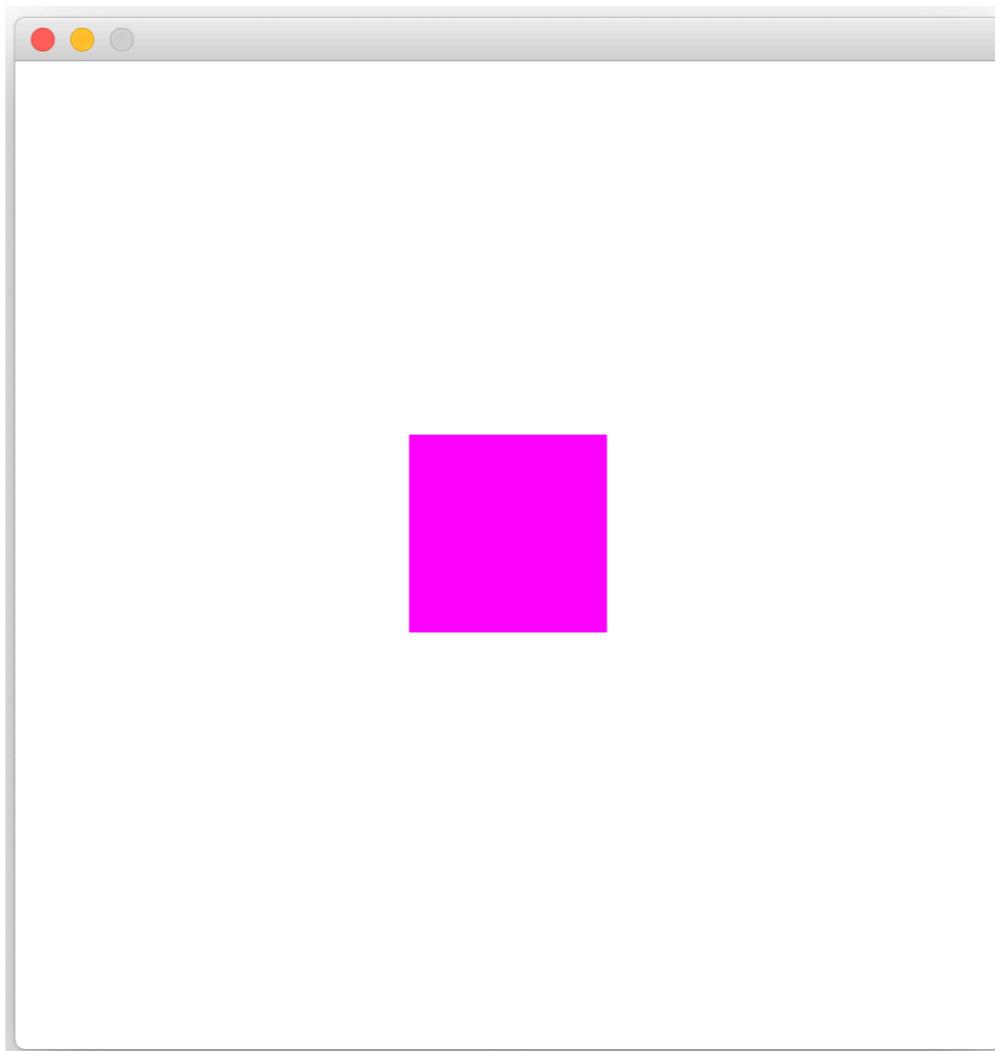


```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```

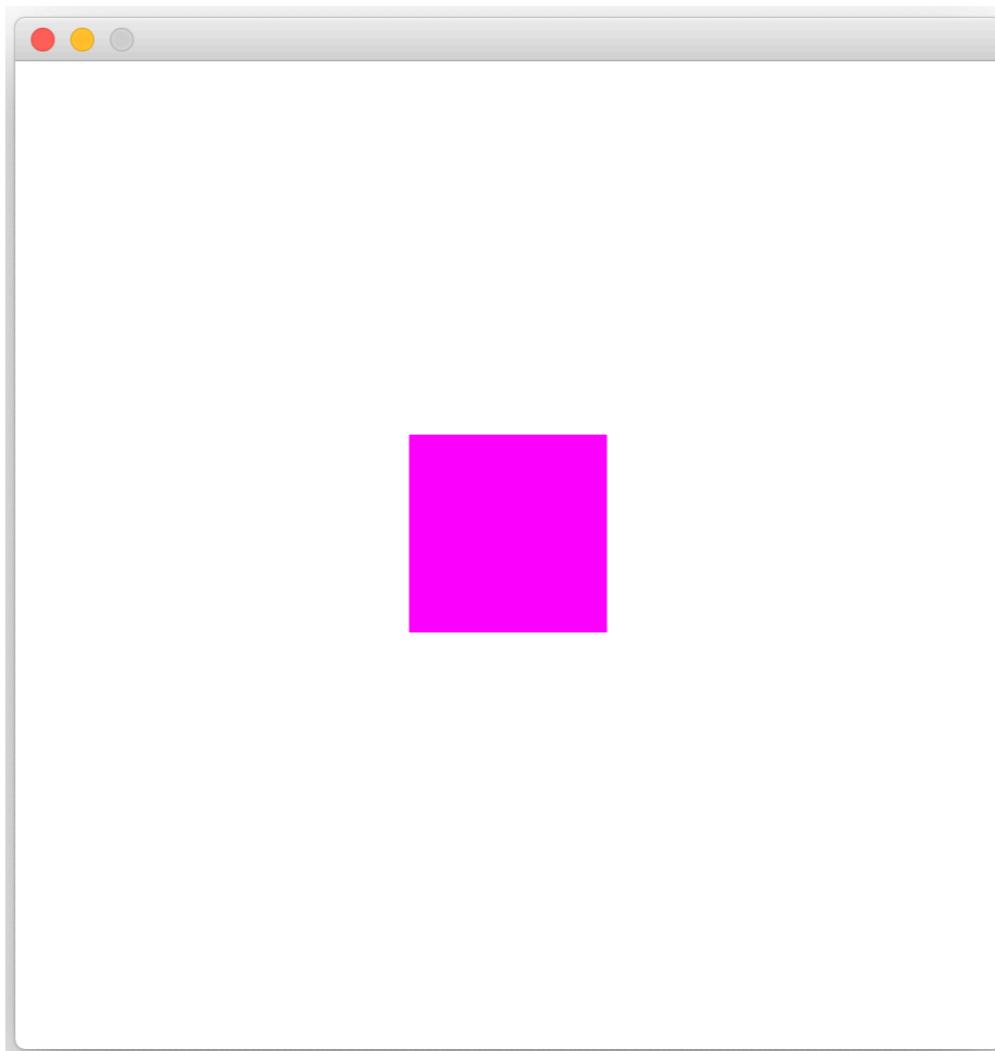
SIZE
 **SIZE**
rect



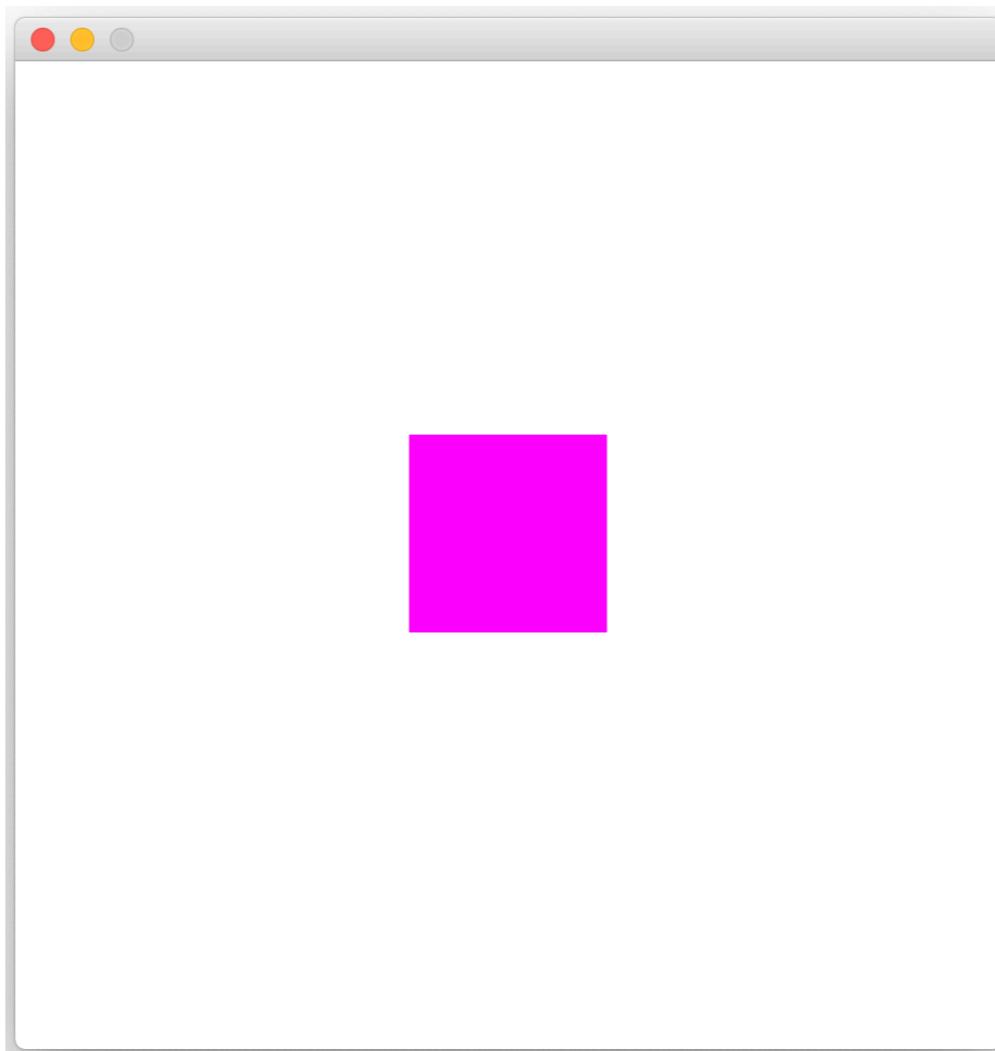
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



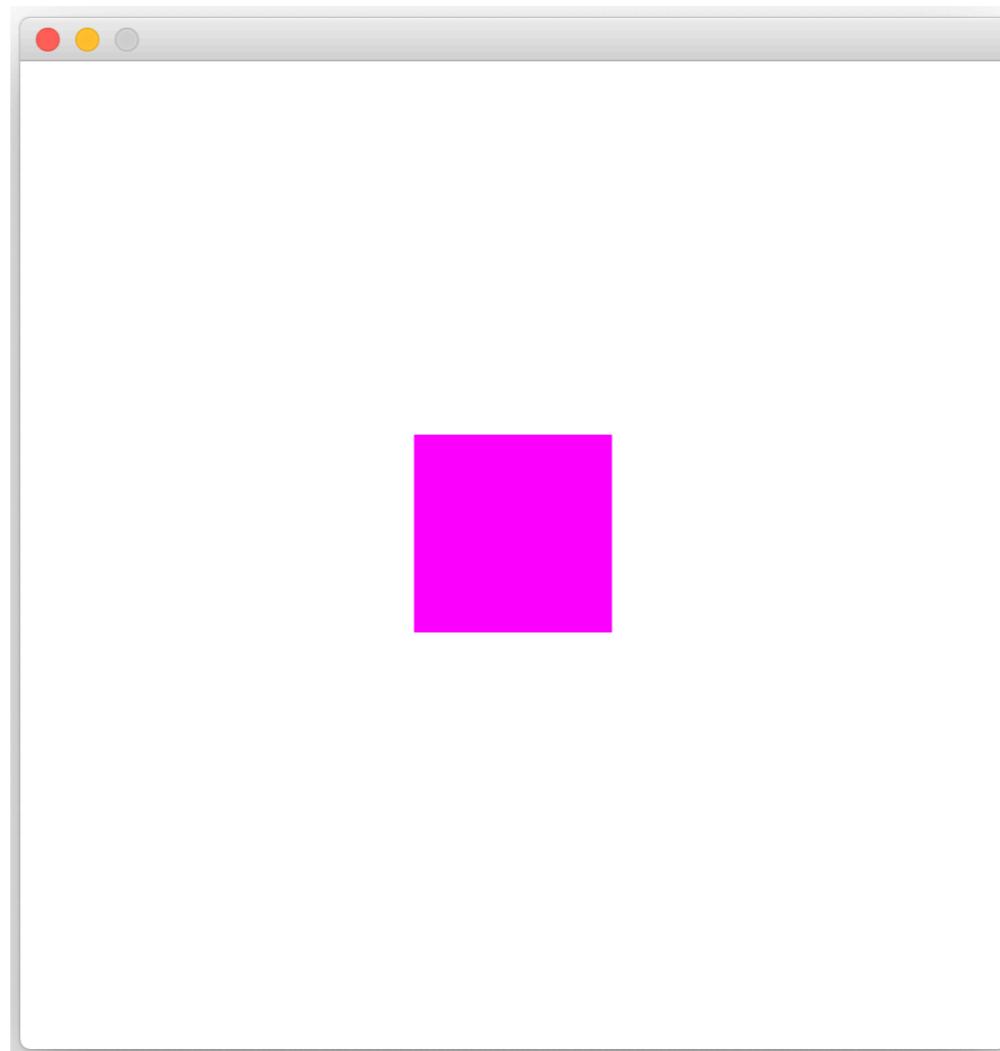
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



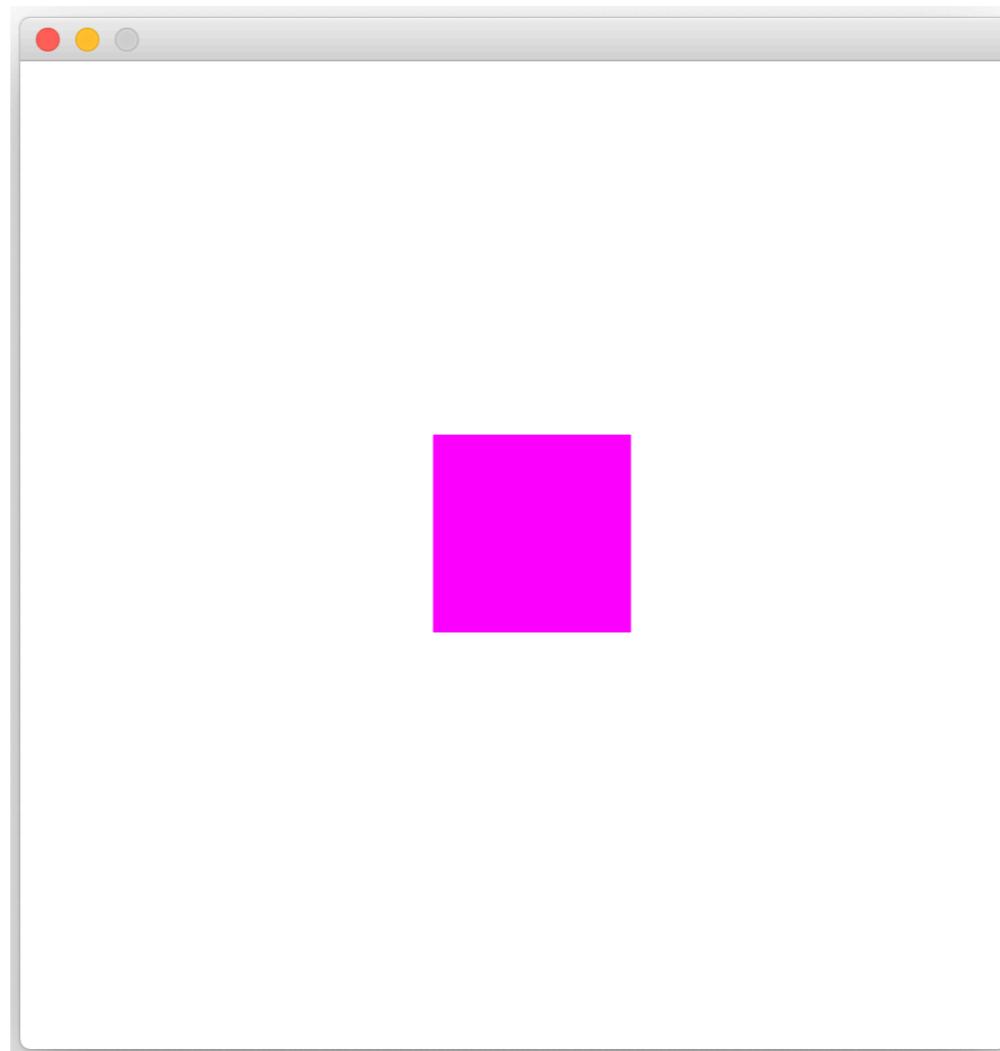
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



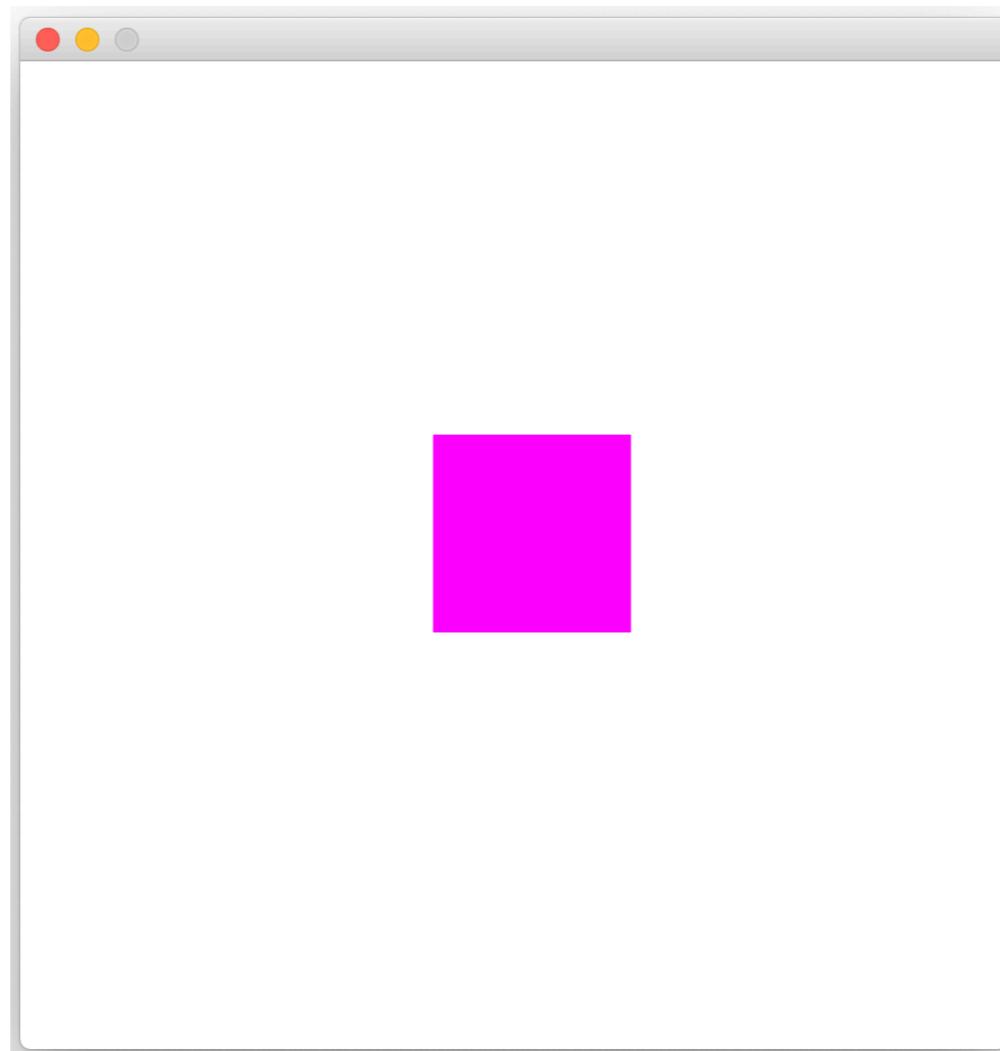
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



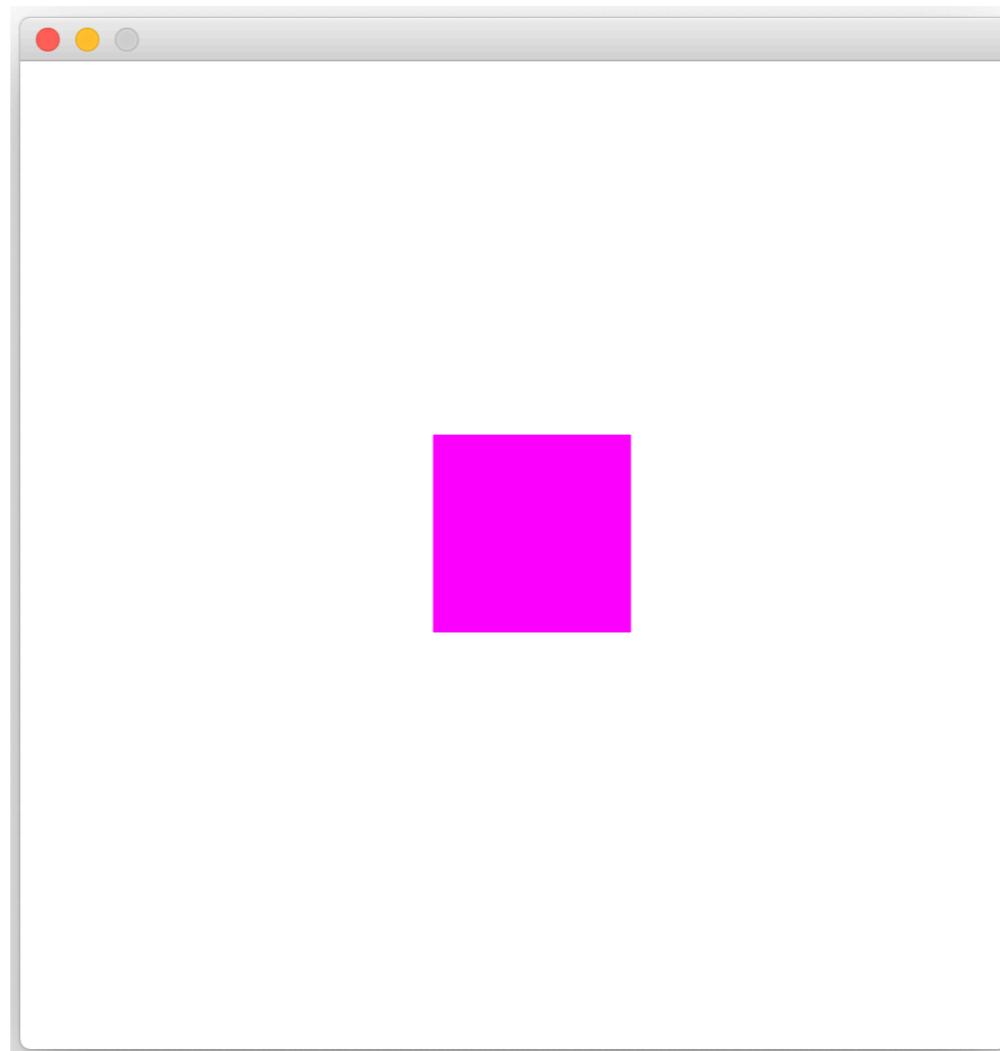
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



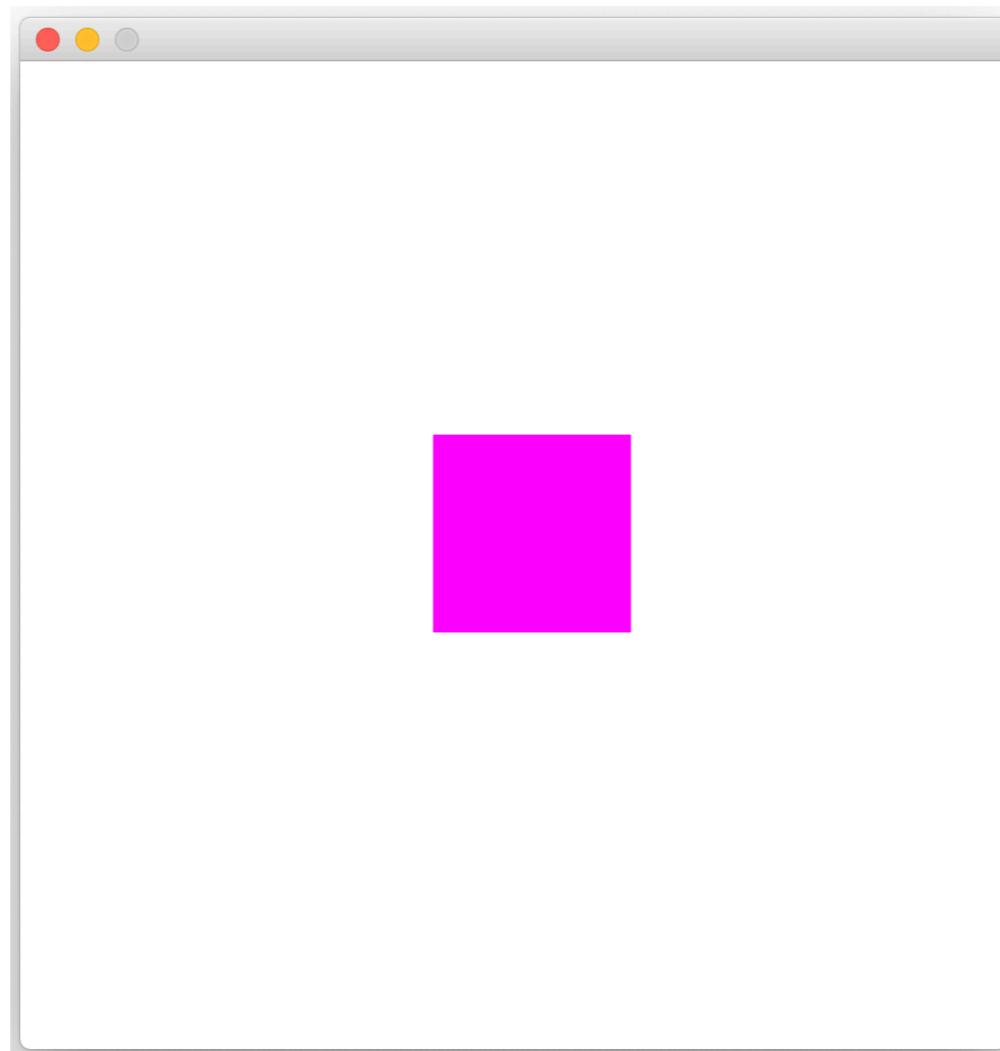
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



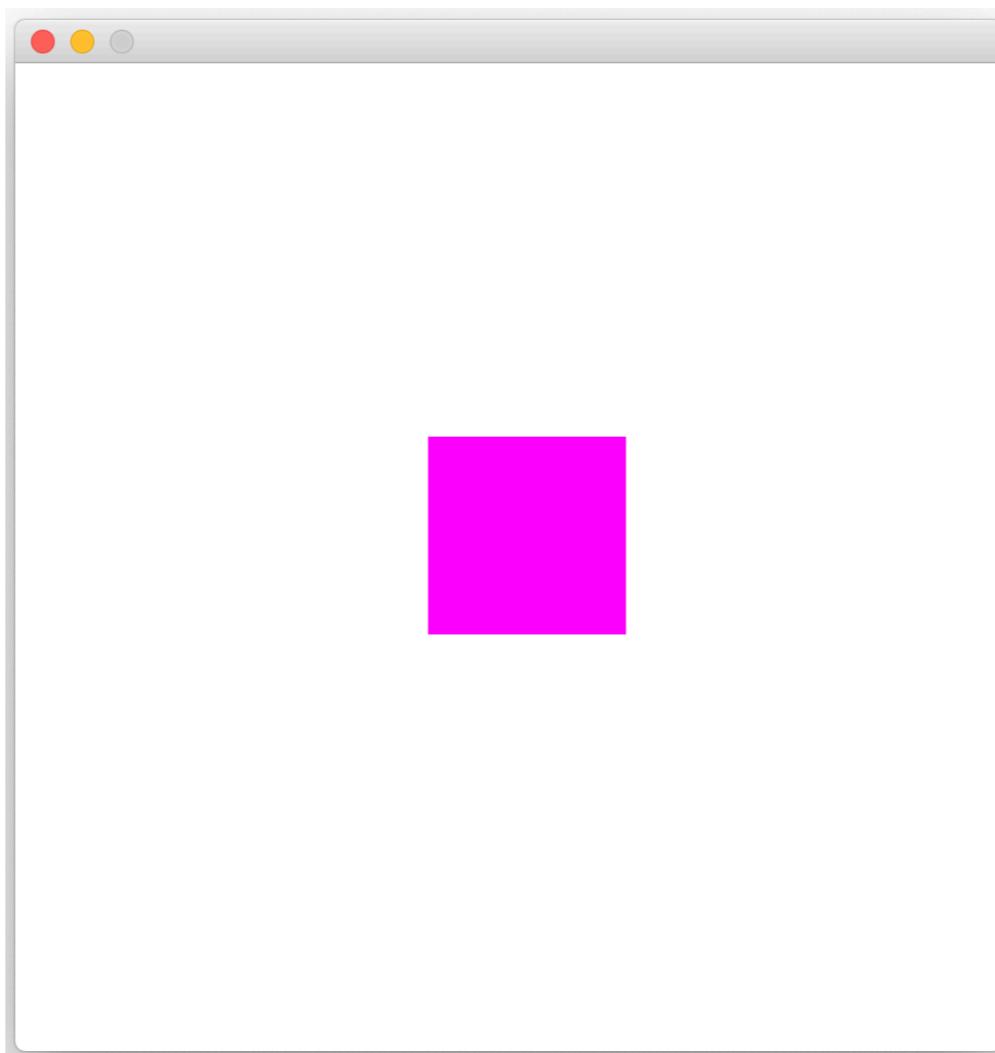
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



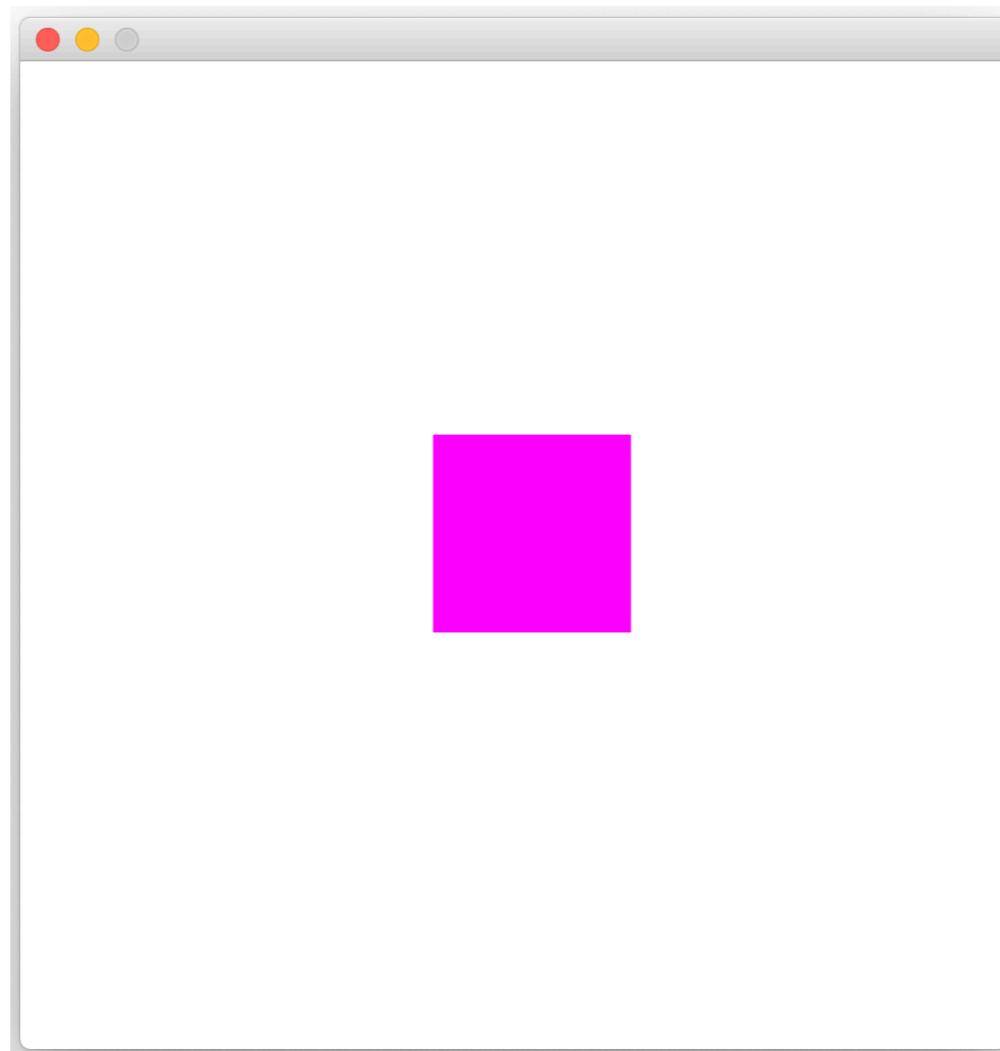
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
    pause(10)
```



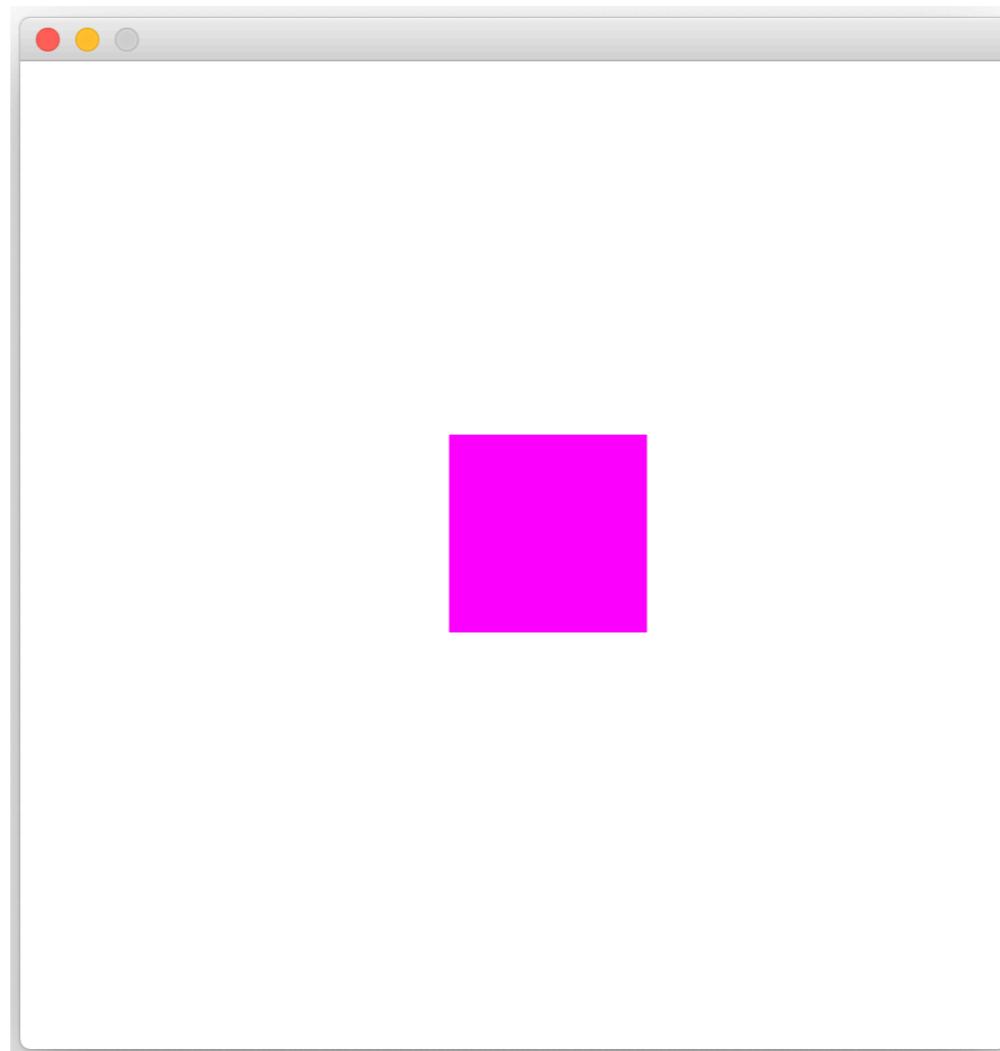
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
    pause(10)
```



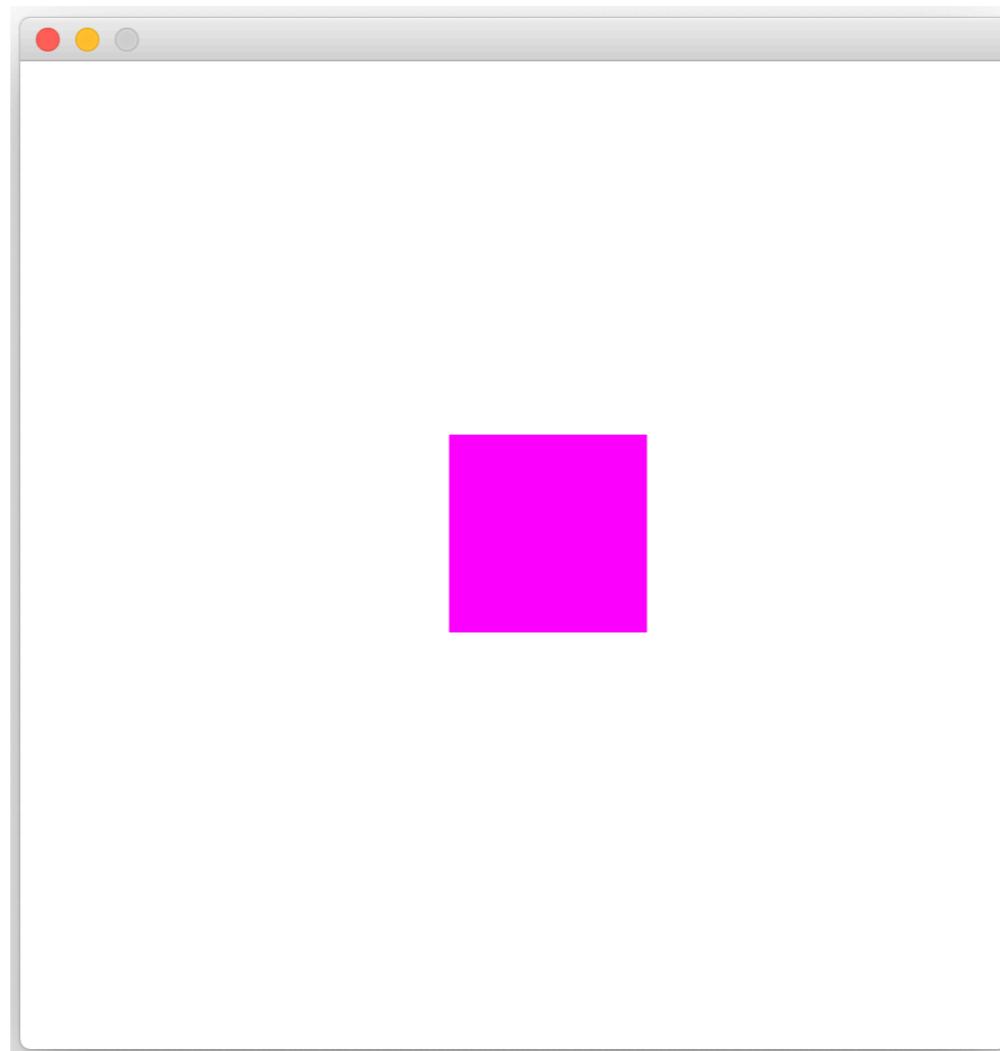
```
def main():
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        if rect.x <= 0 or rect.x+rect.width >= window.width:
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        pause(10)
```



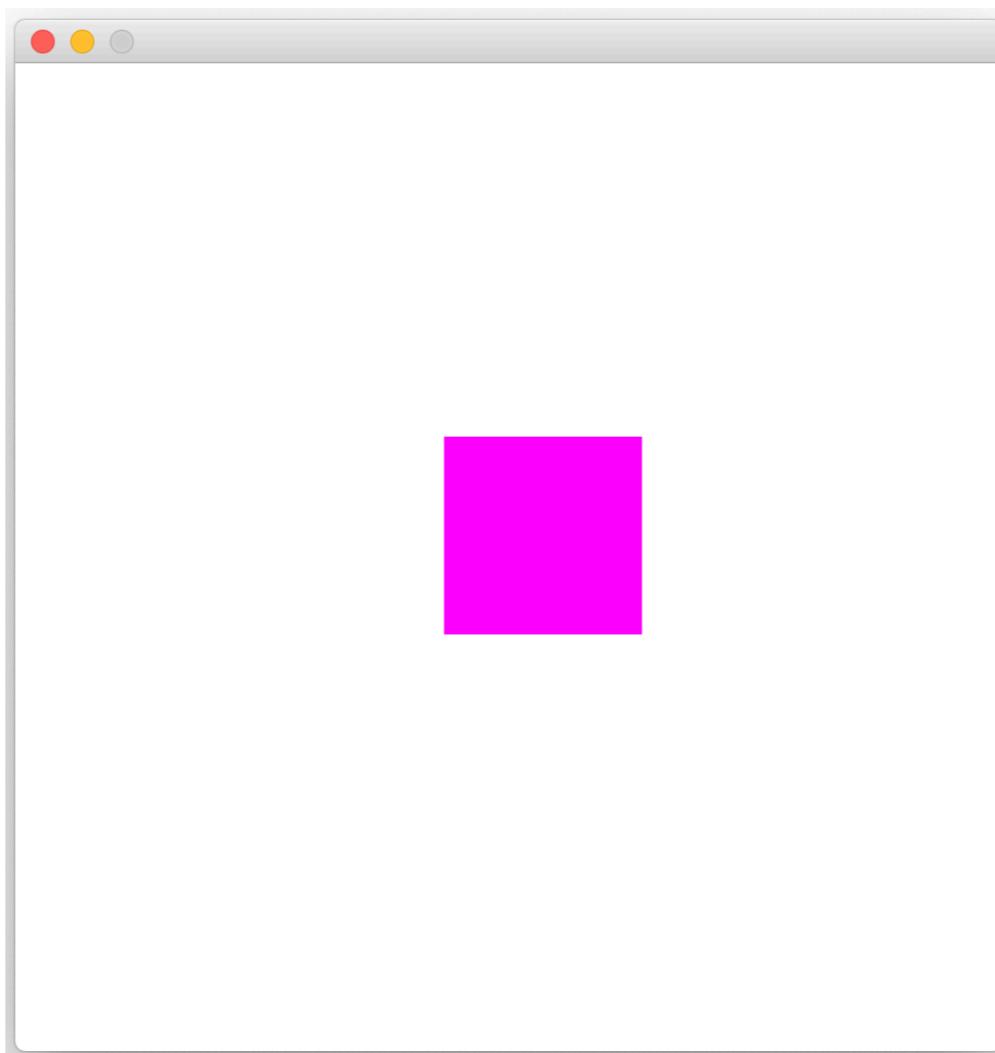
```
def main():
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        pause(10)
```



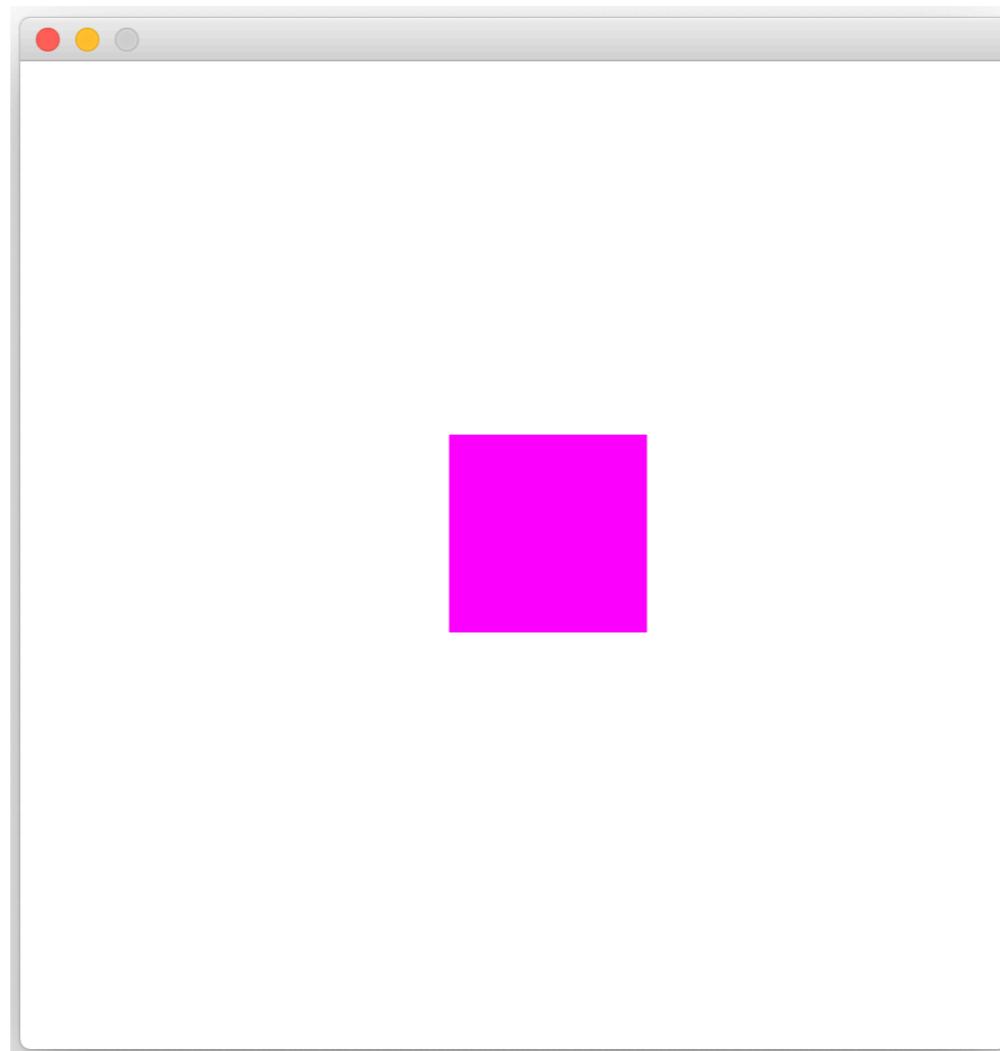
```
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        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



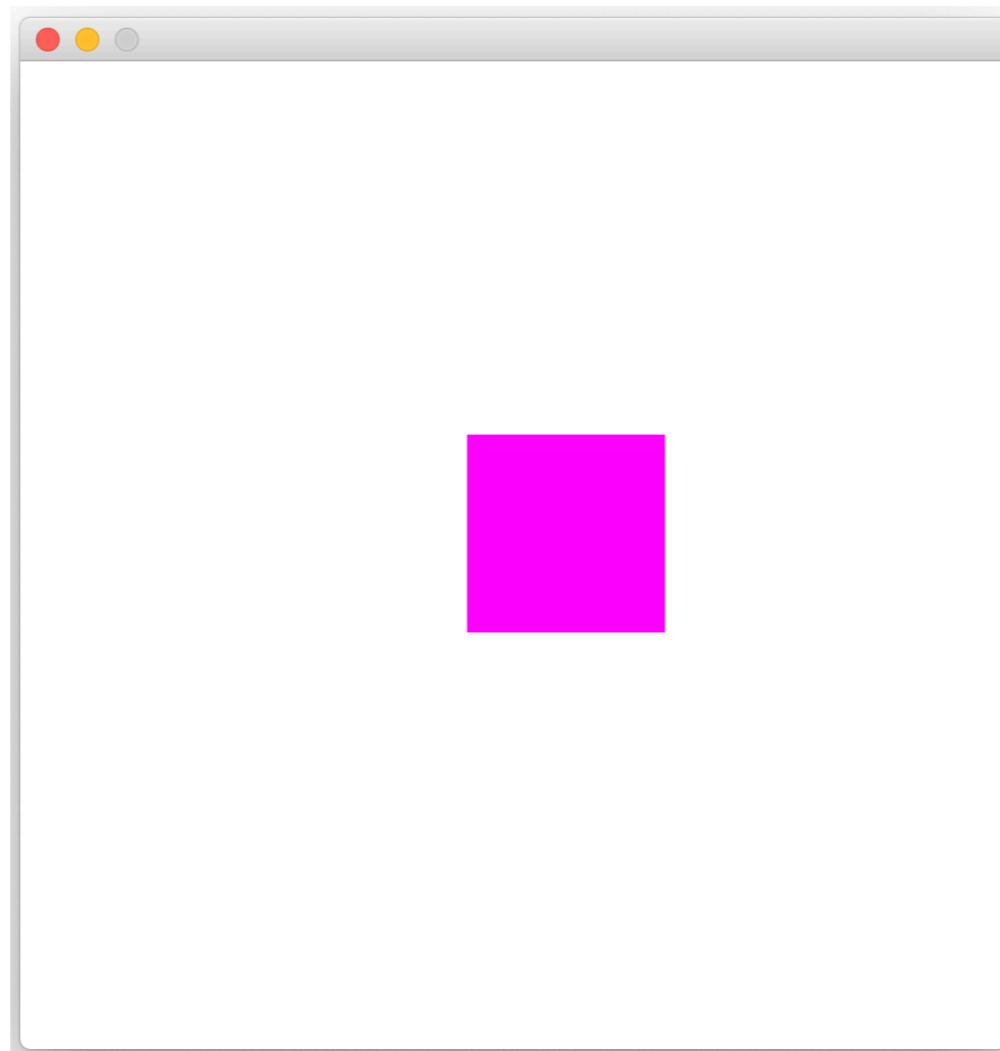
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
    pause(10)
```



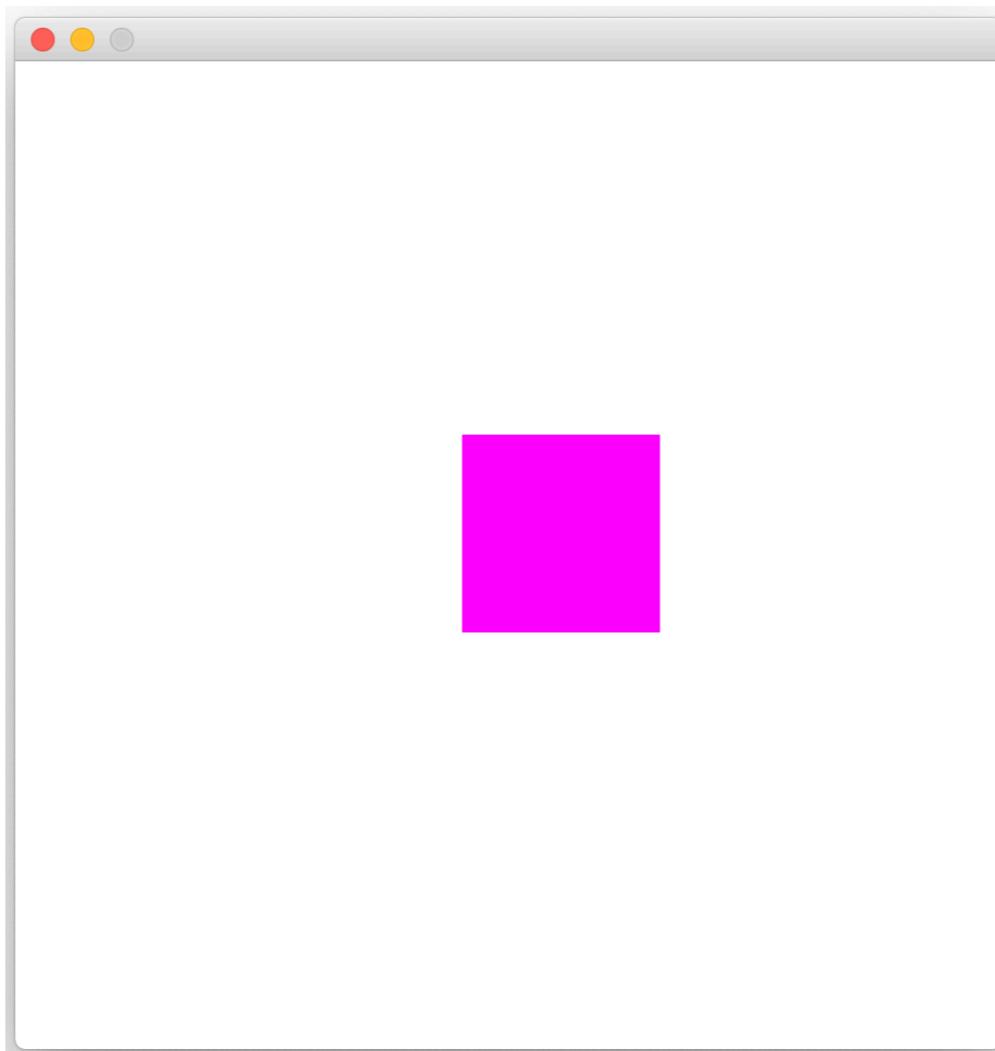
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
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        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



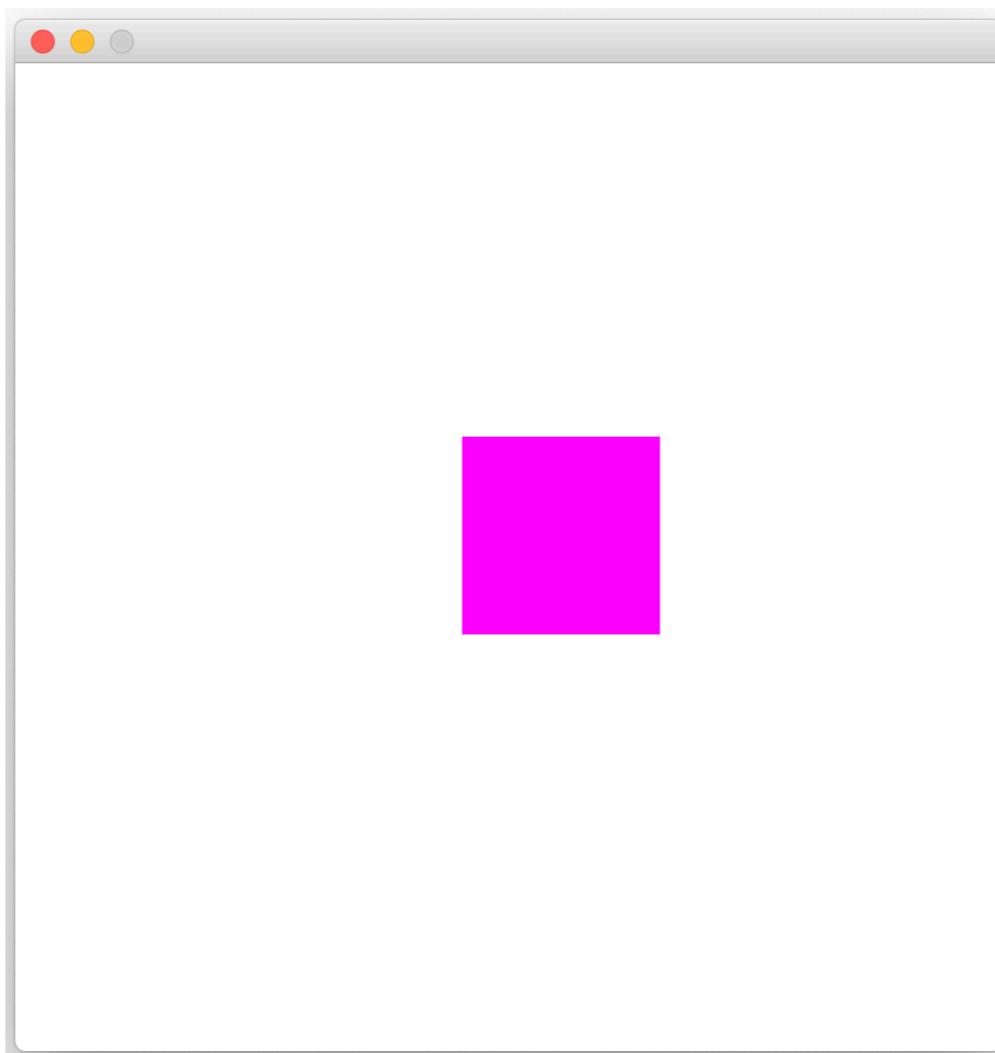
```
def main():
    window = GWindow()
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    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



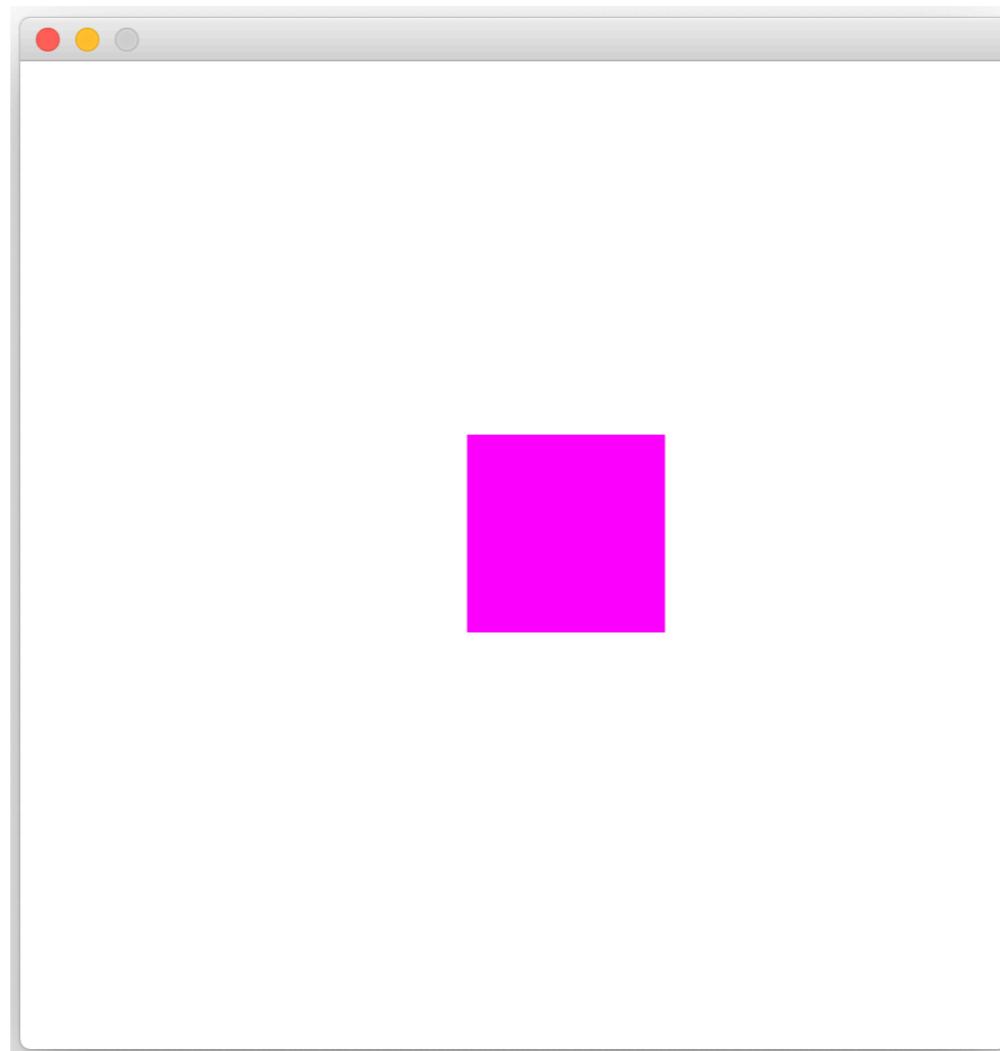
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



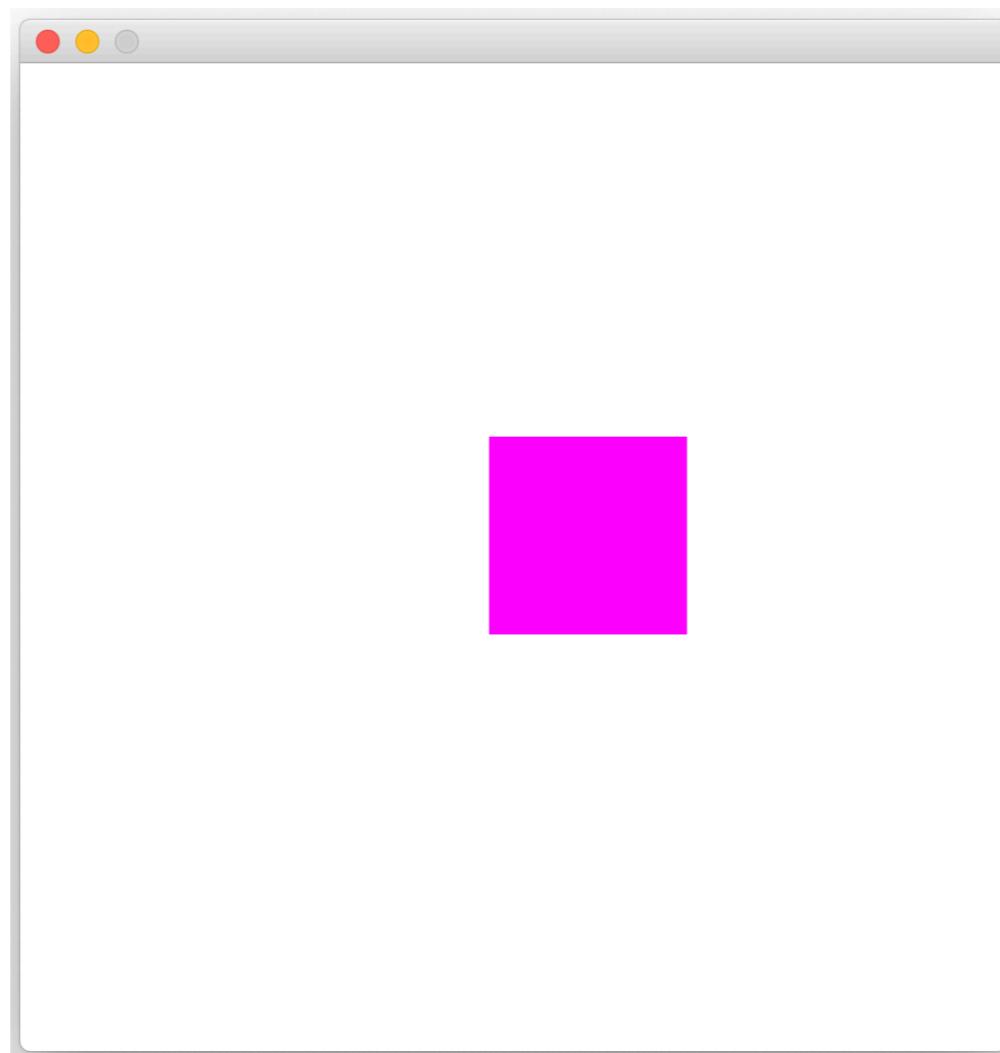
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
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        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
    pause(10)
```



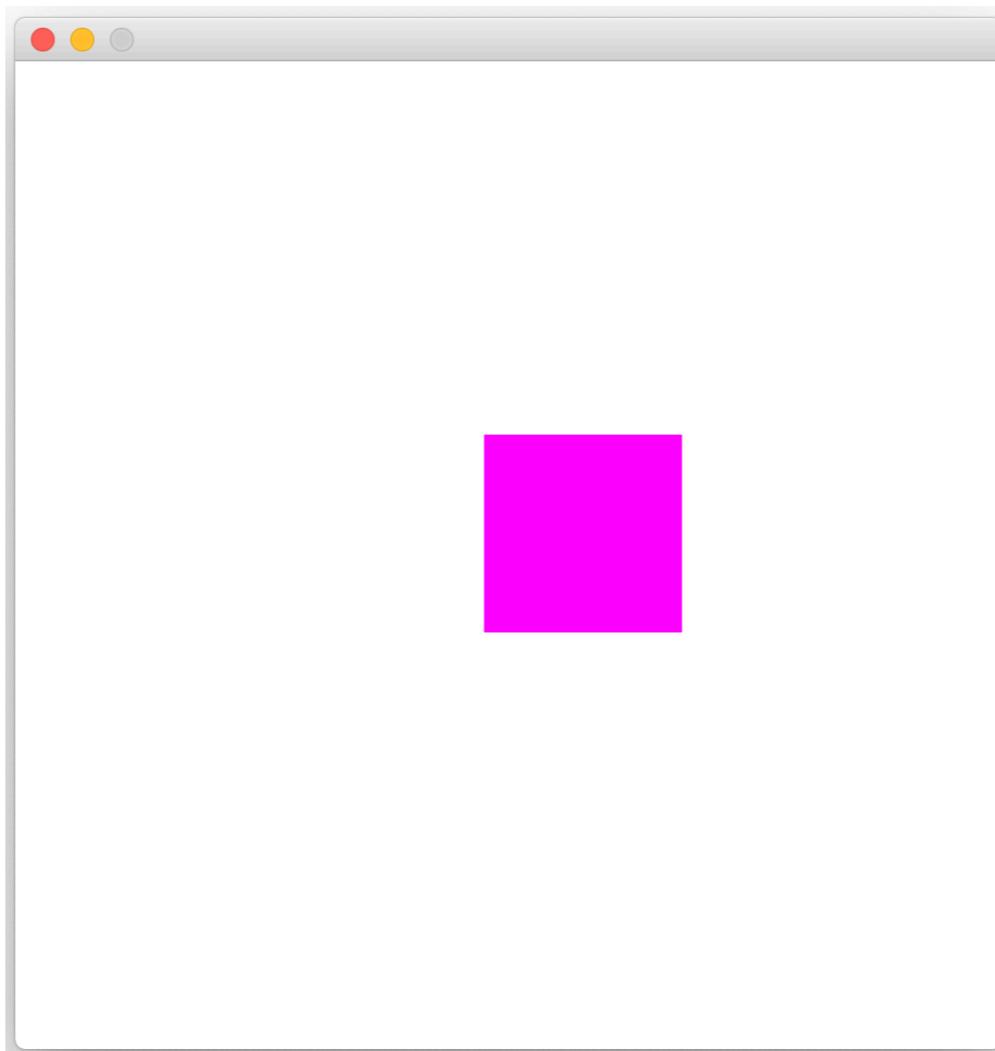
```
def main():
    window = GWindow()
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    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



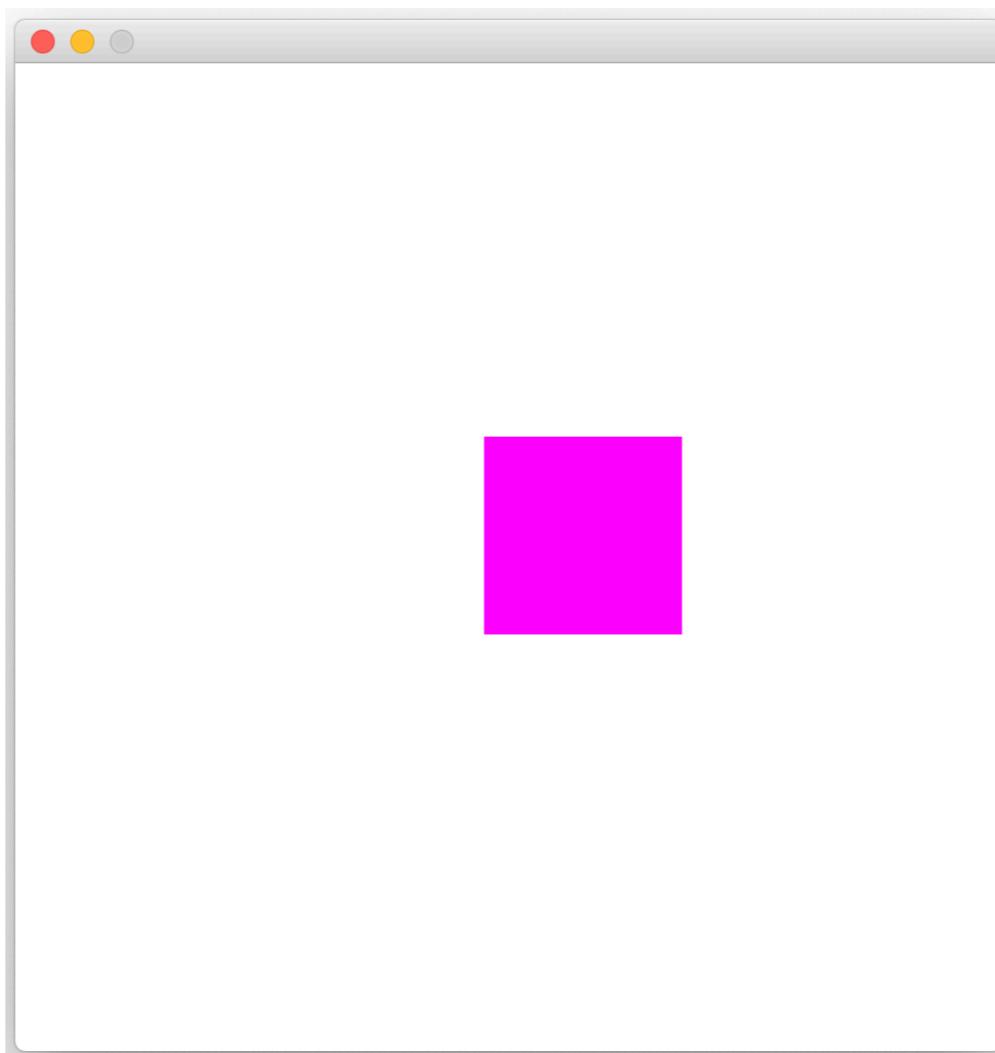
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



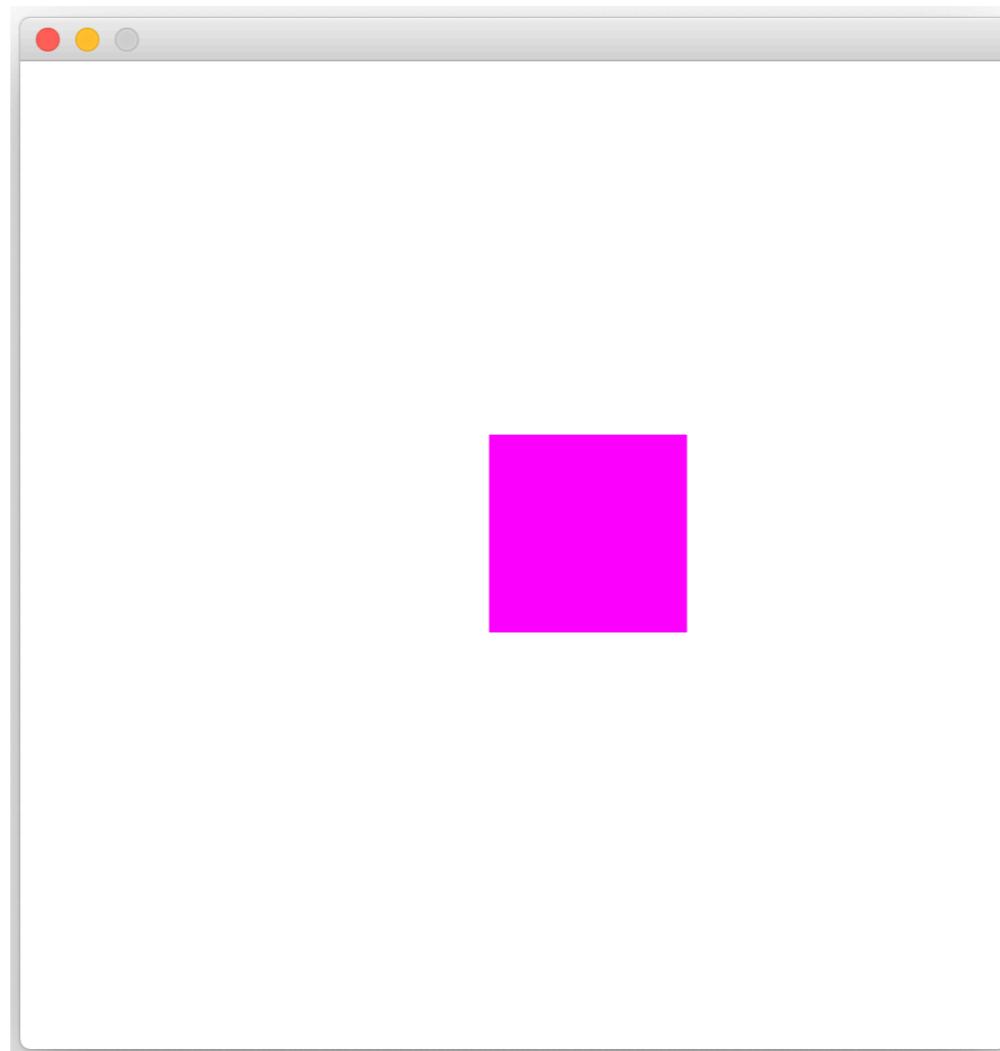
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



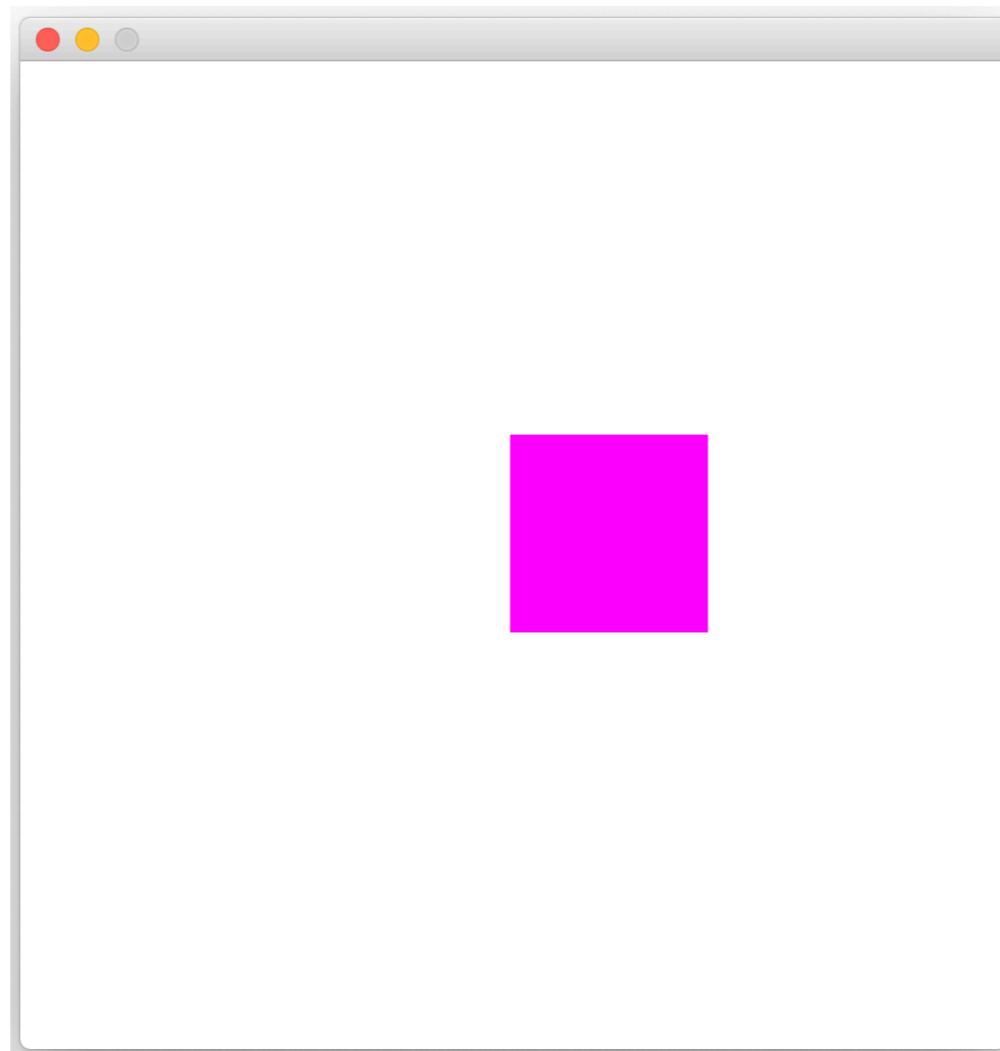
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
    pause(10)
```



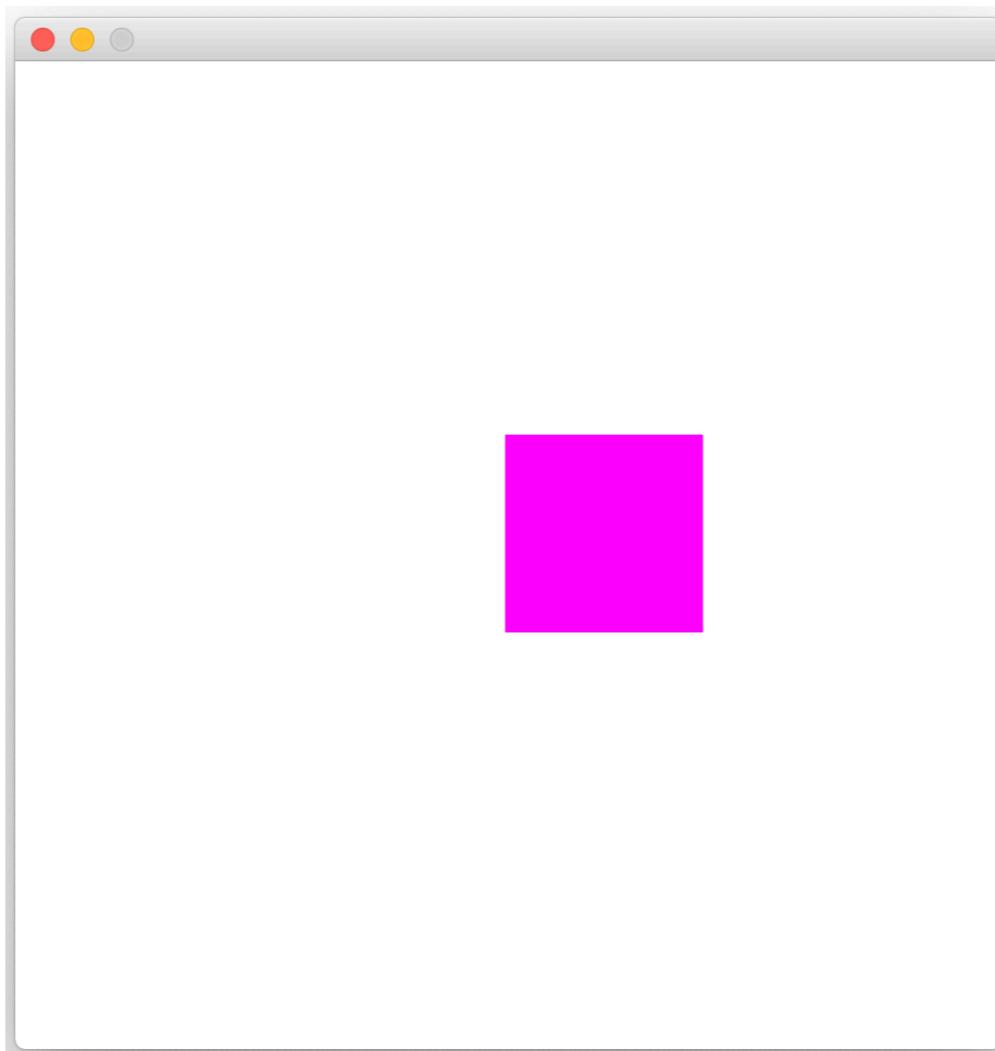
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



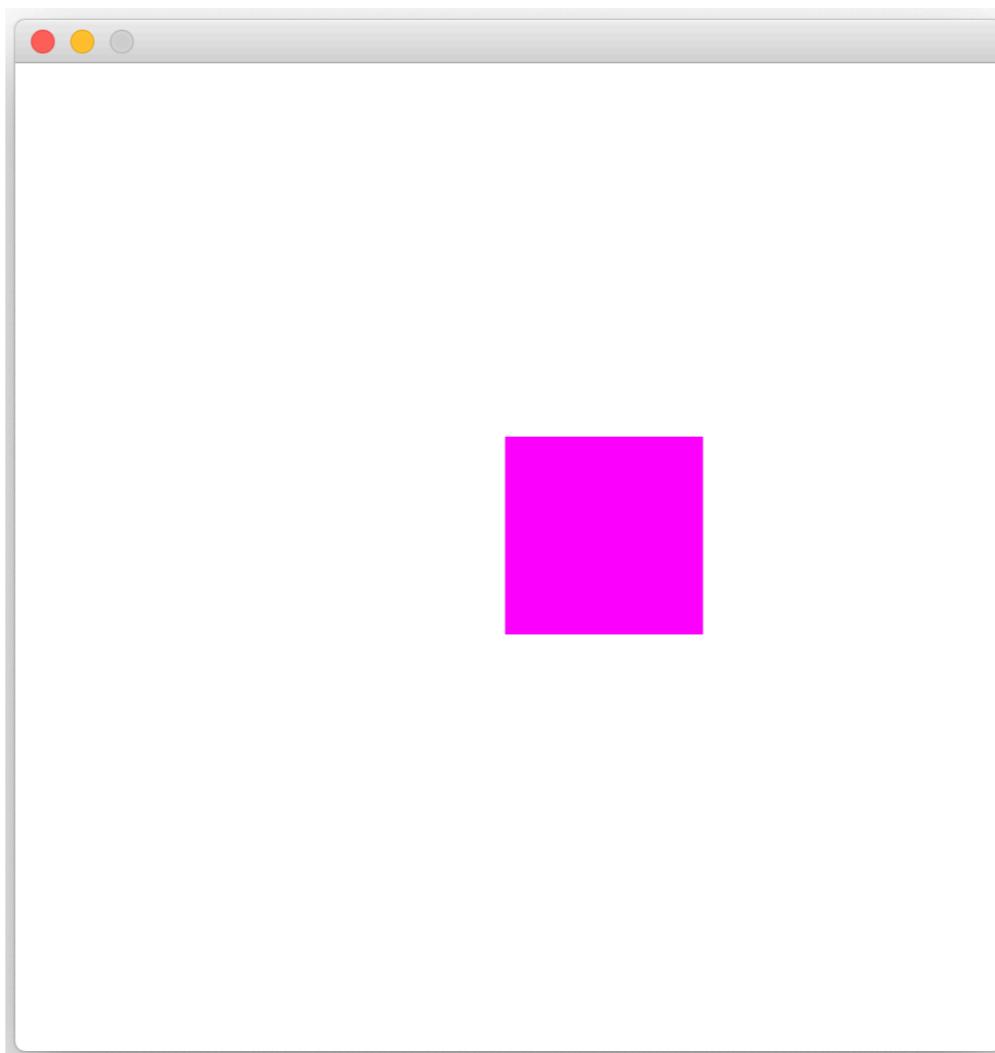
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



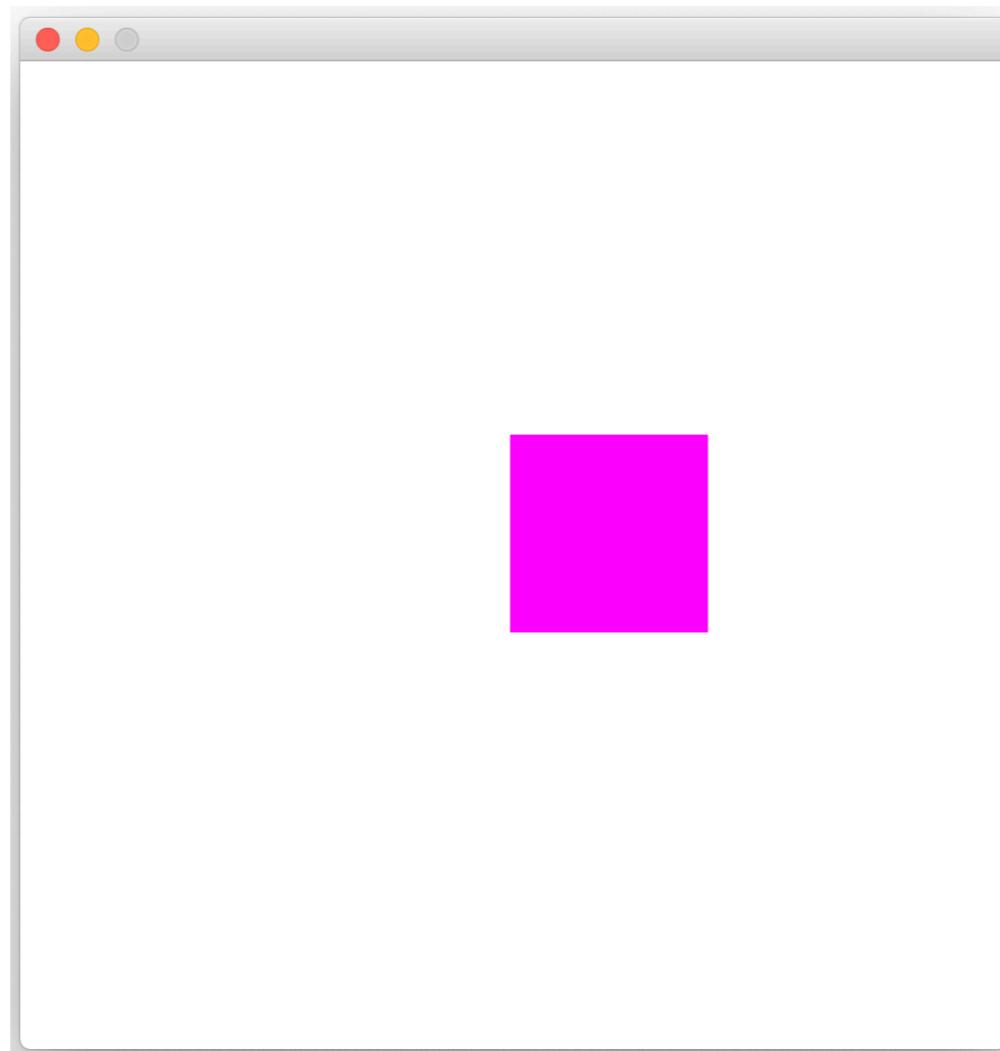
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



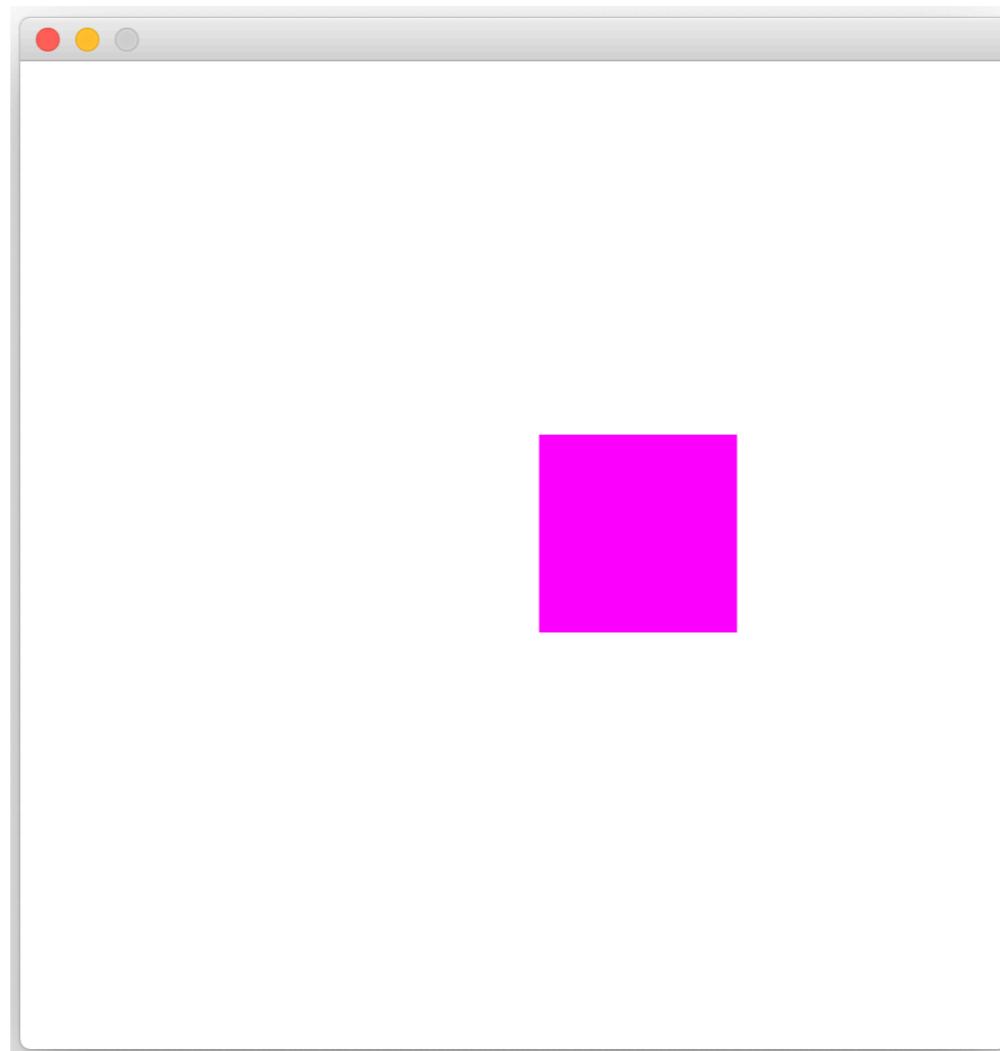
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



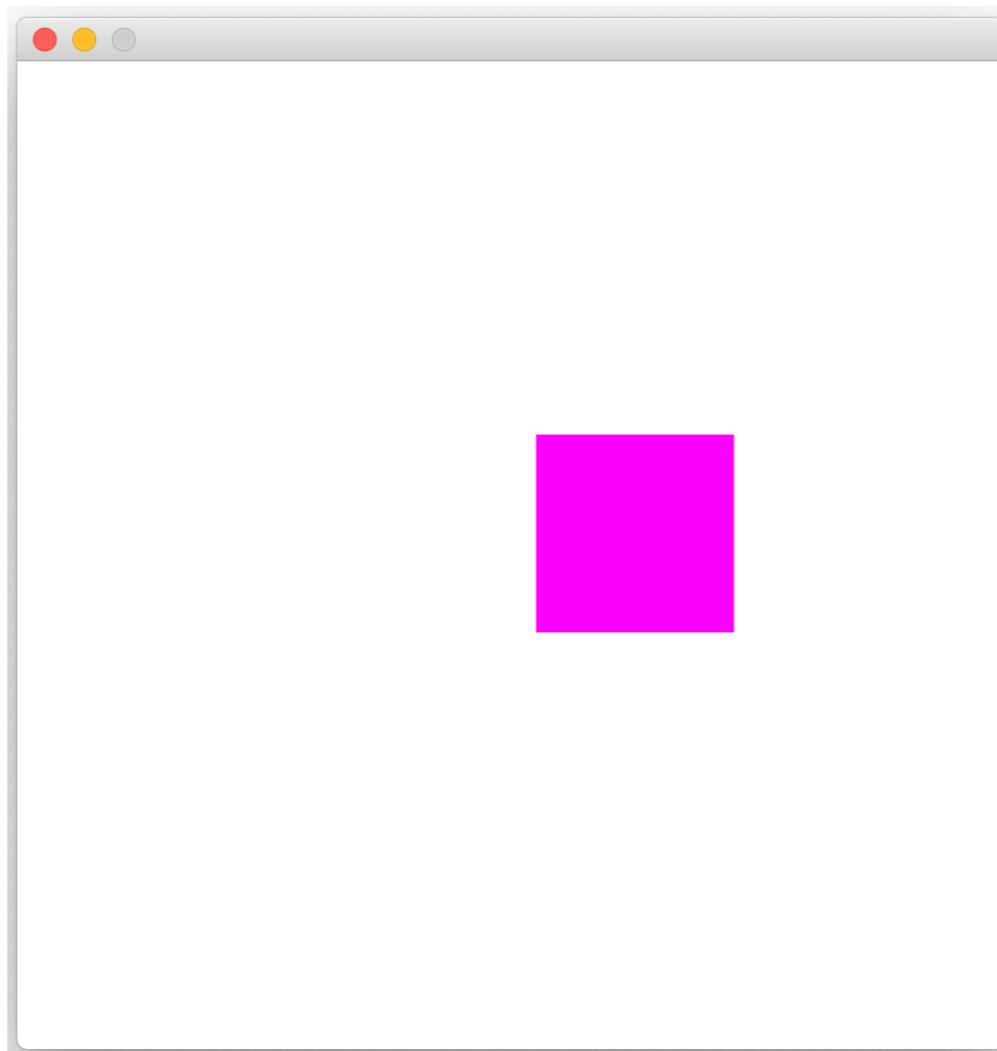
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



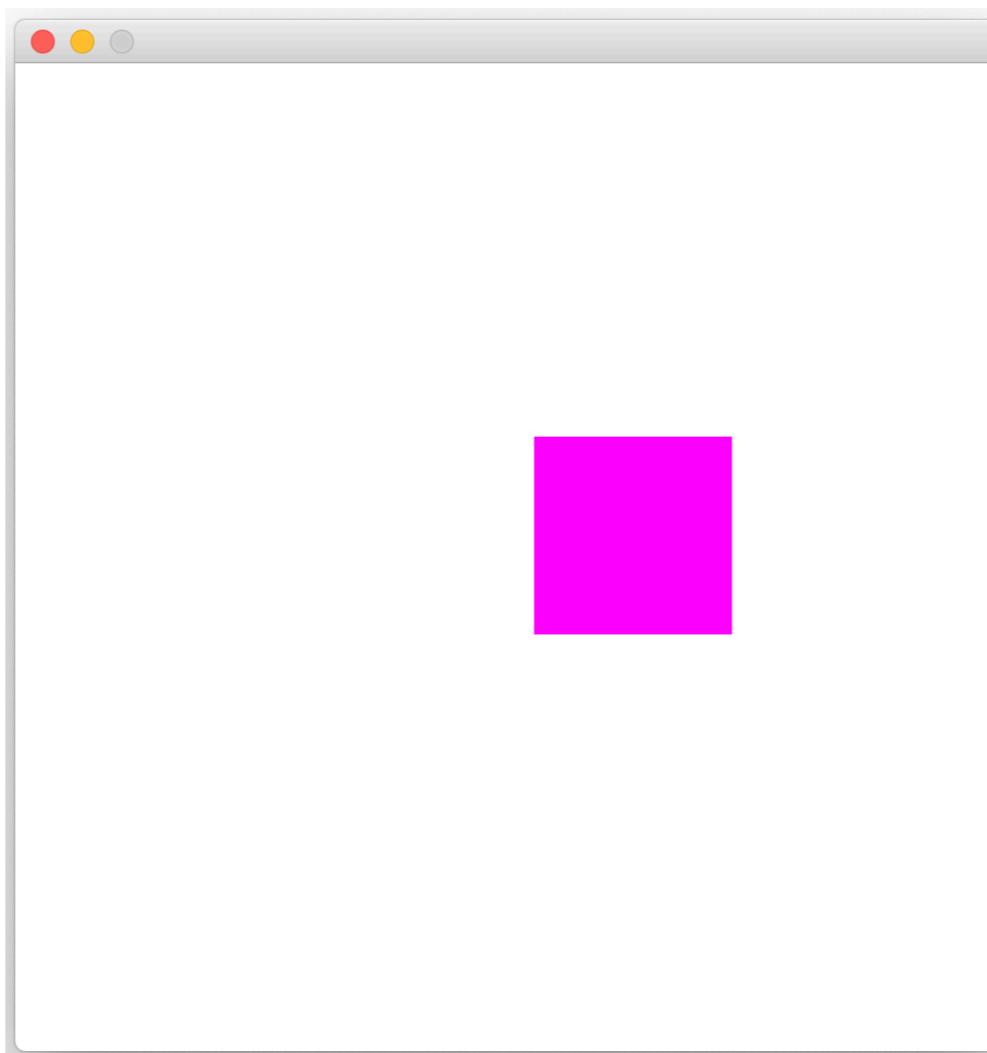
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



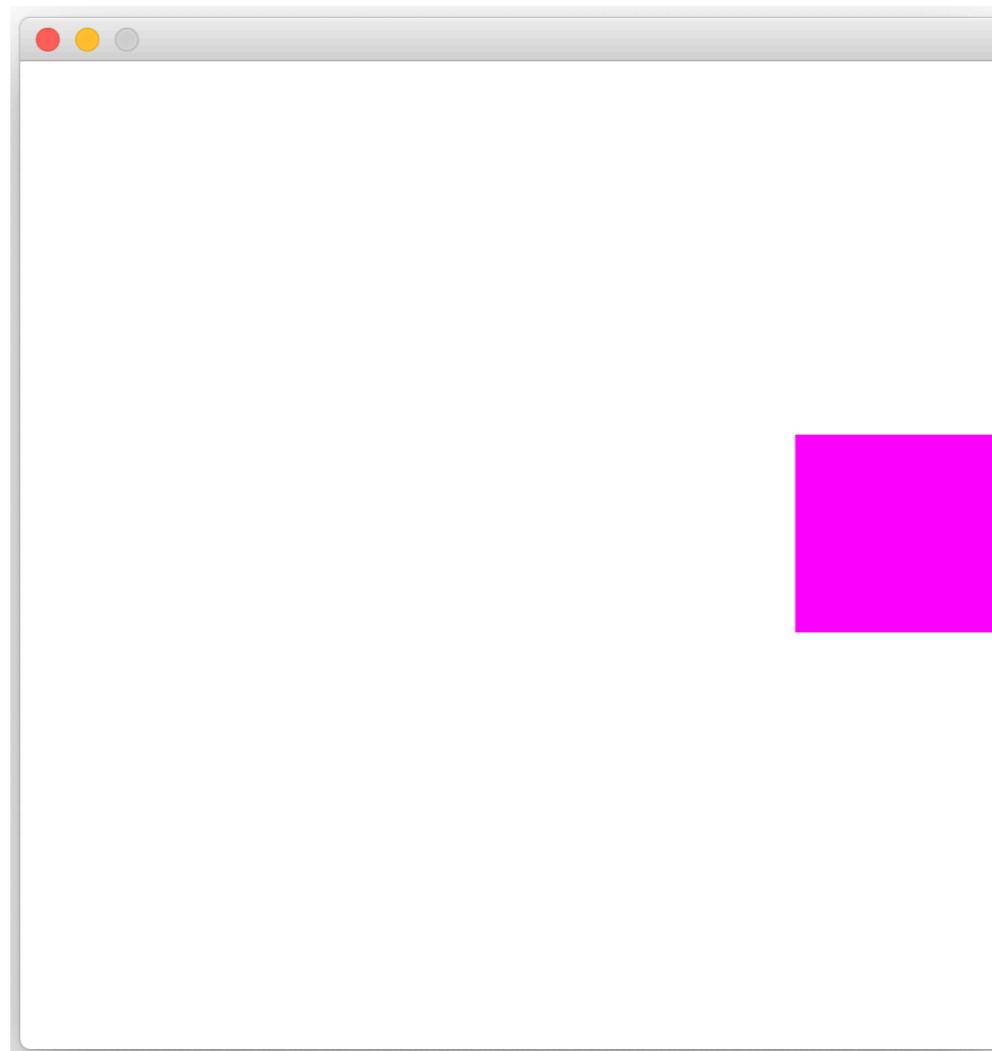
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



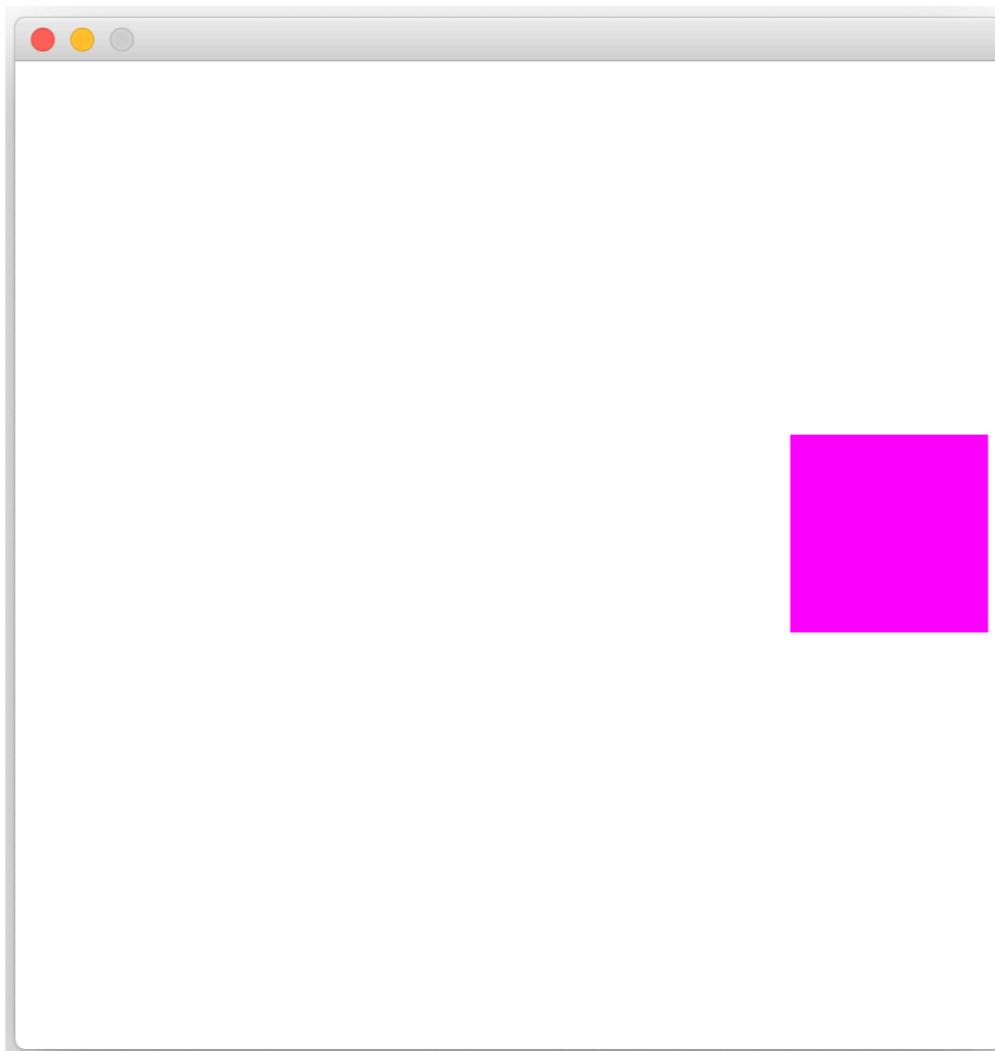
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
    pause(10)
```



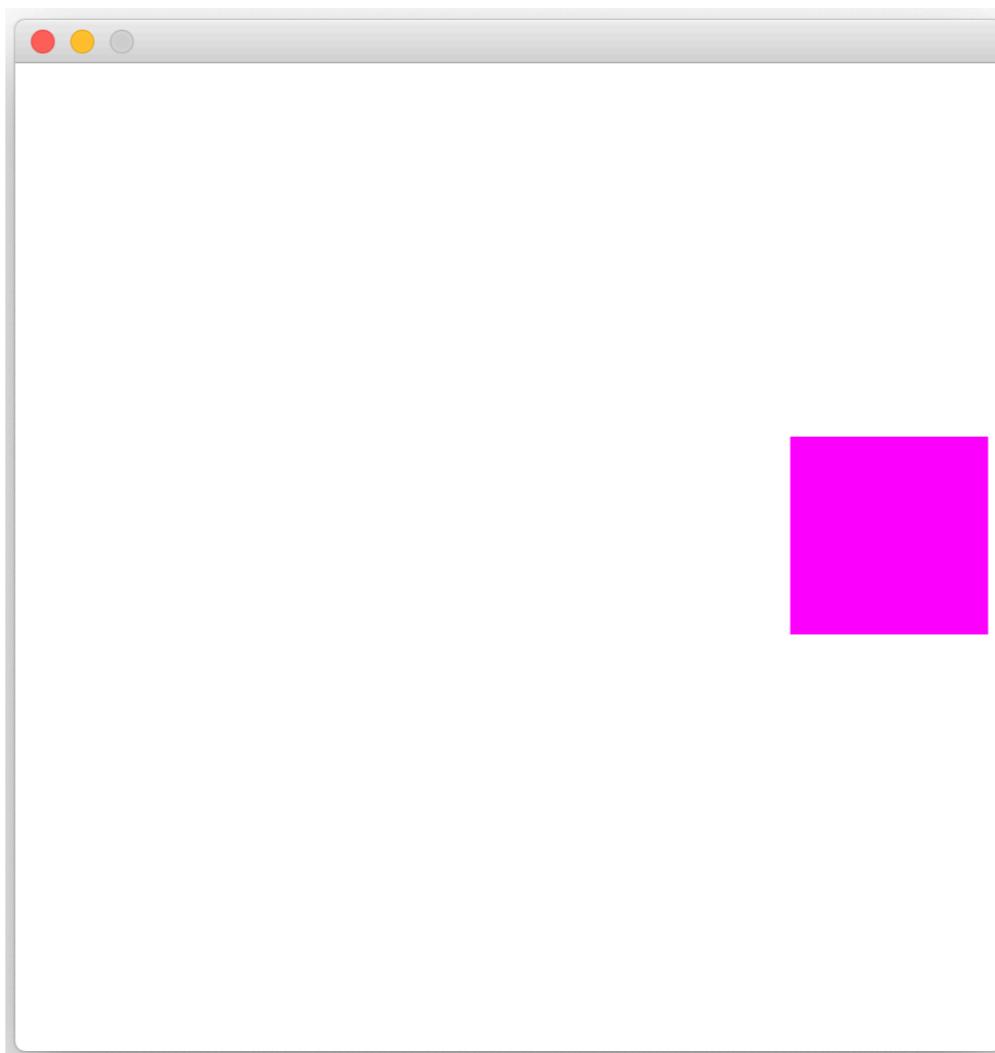
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



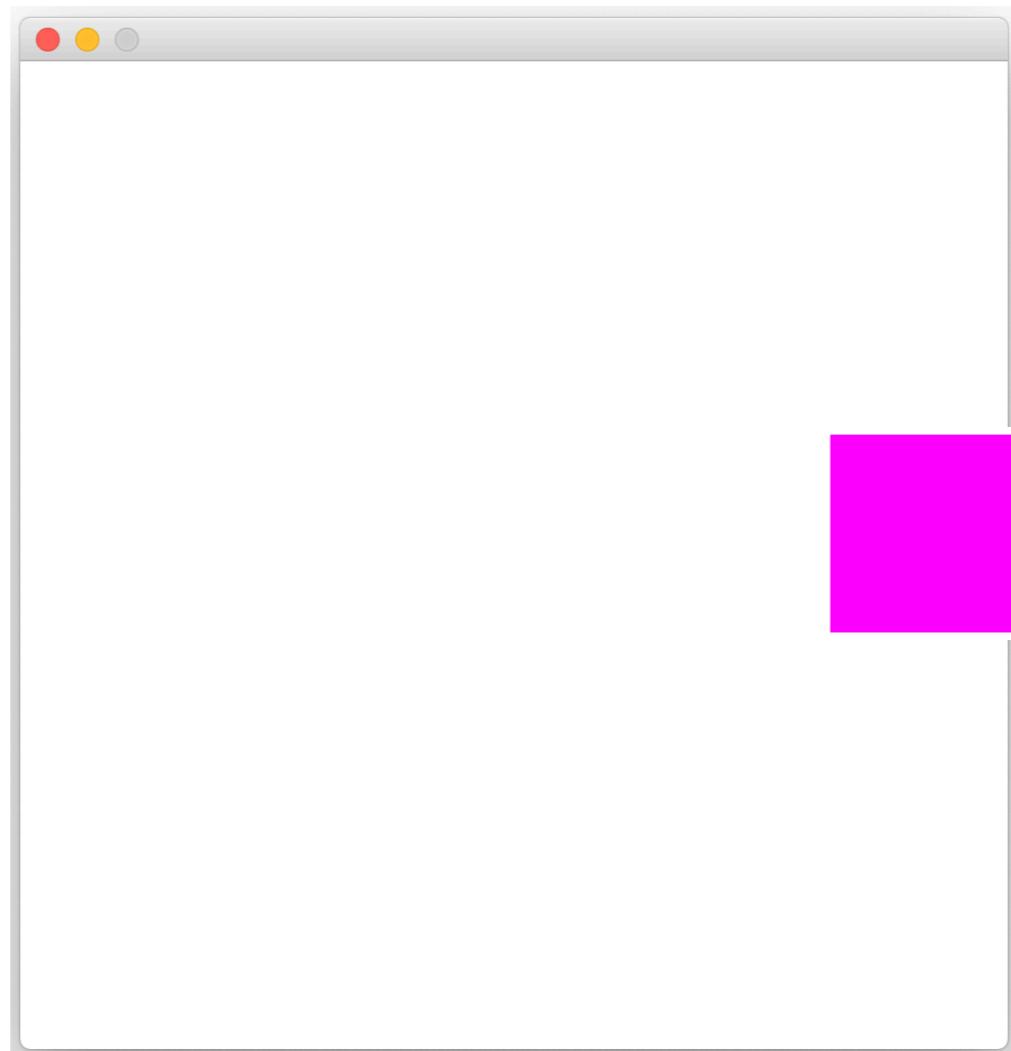
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



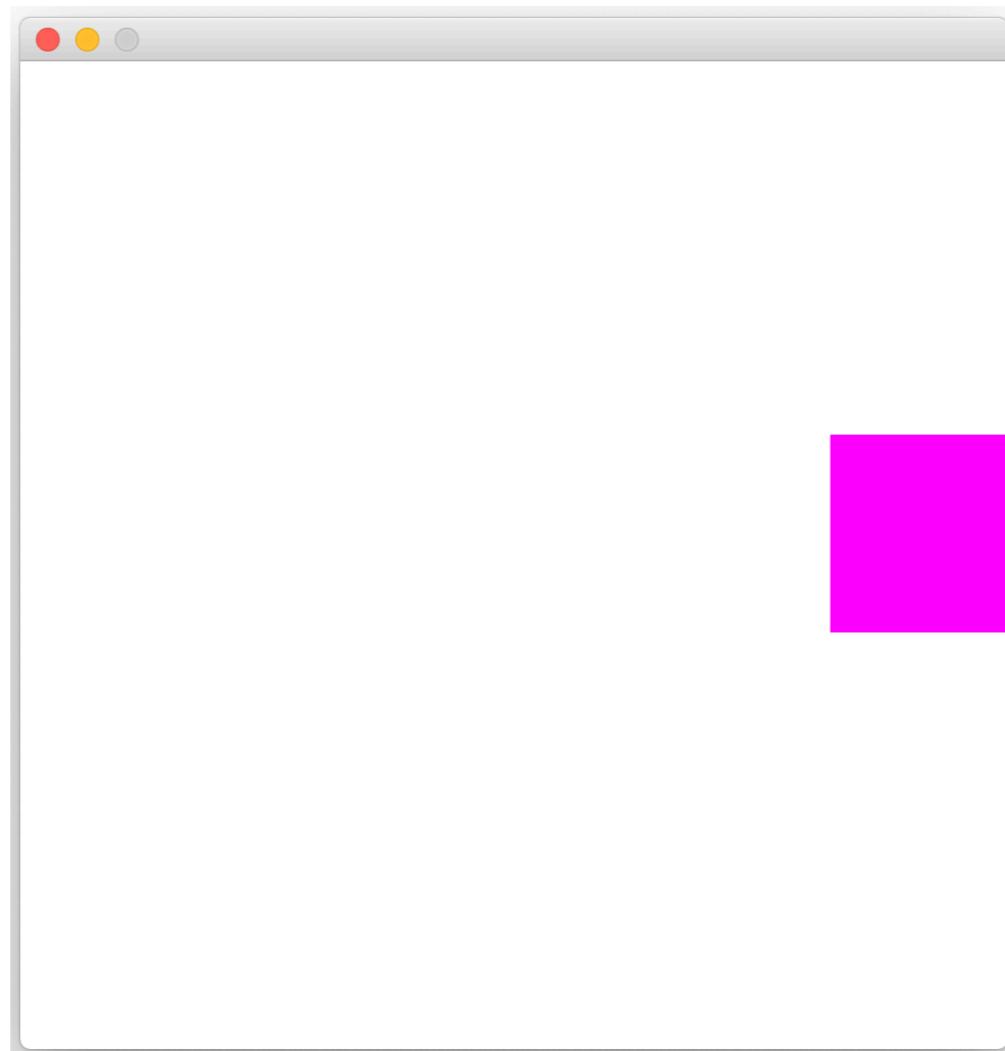
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
    pause(10)
```



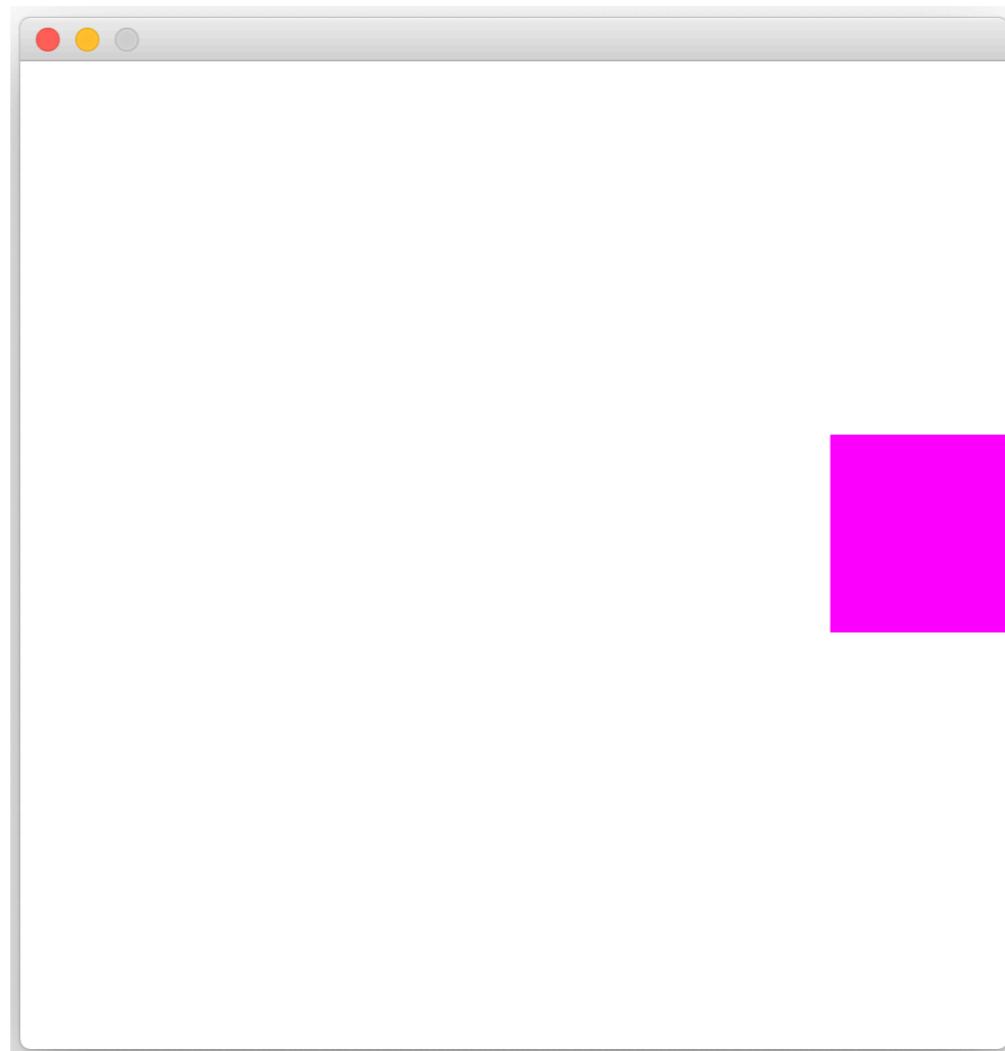
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



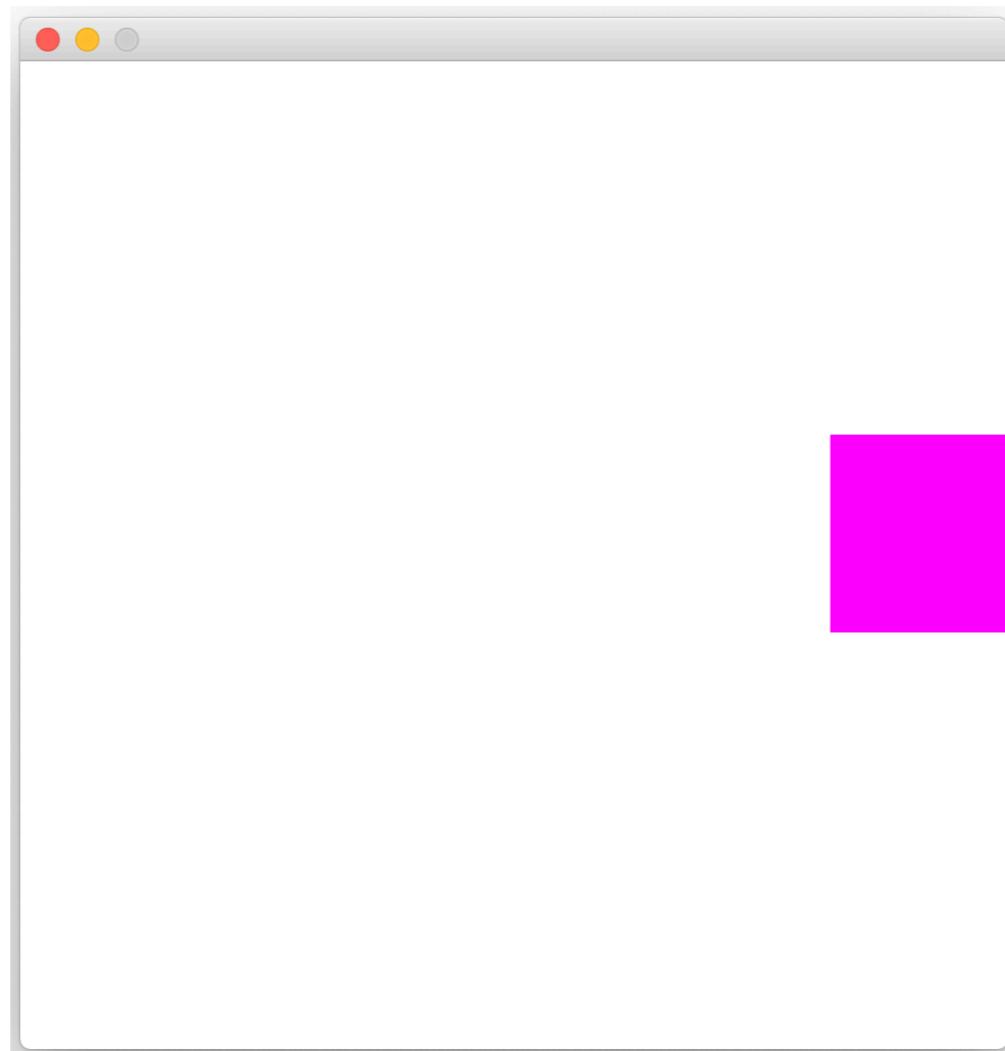
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



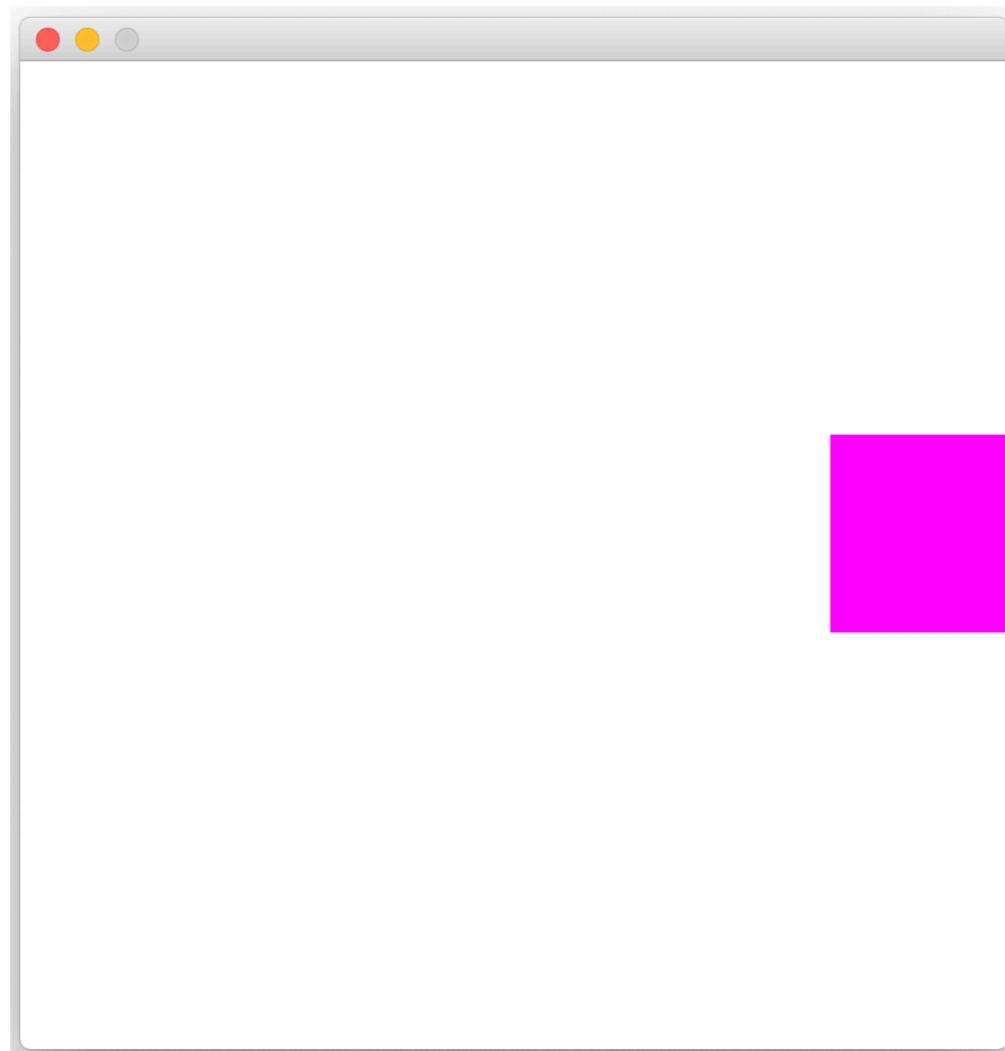
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



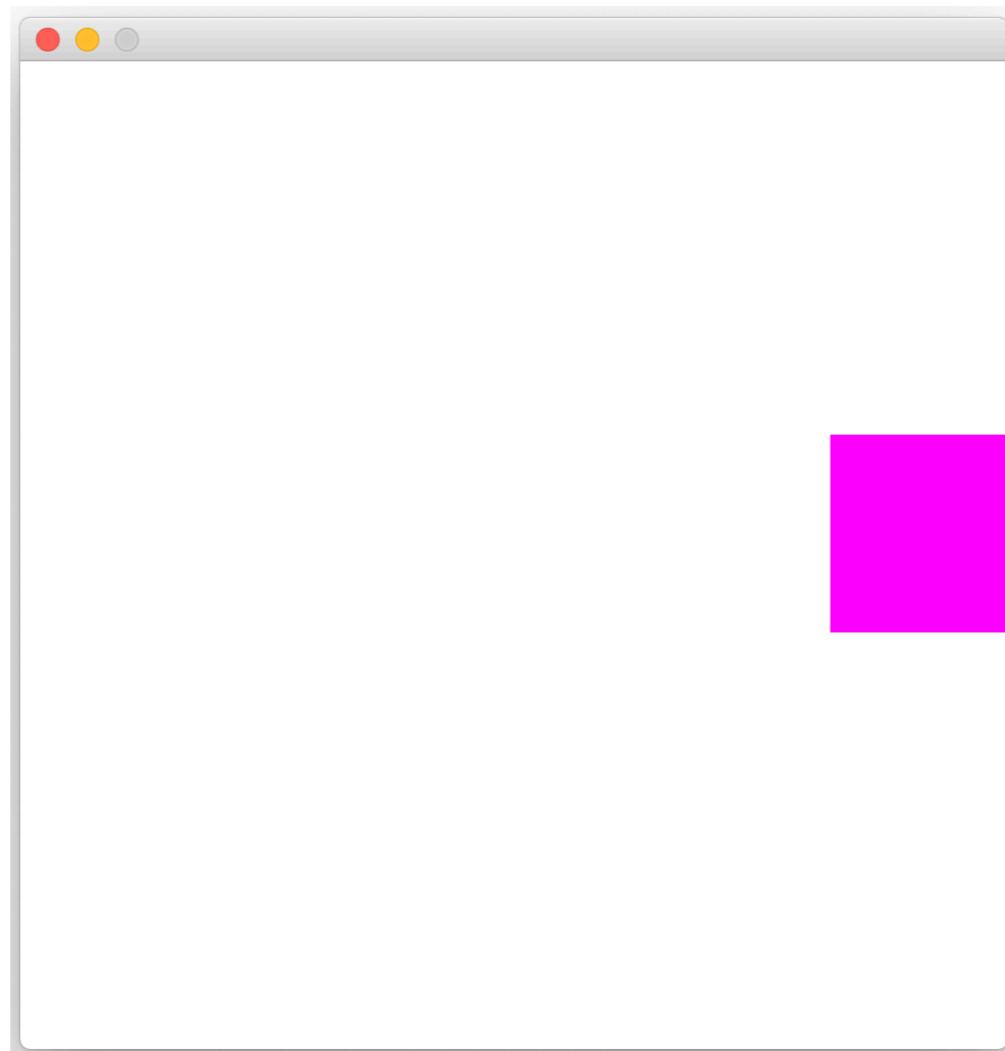
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



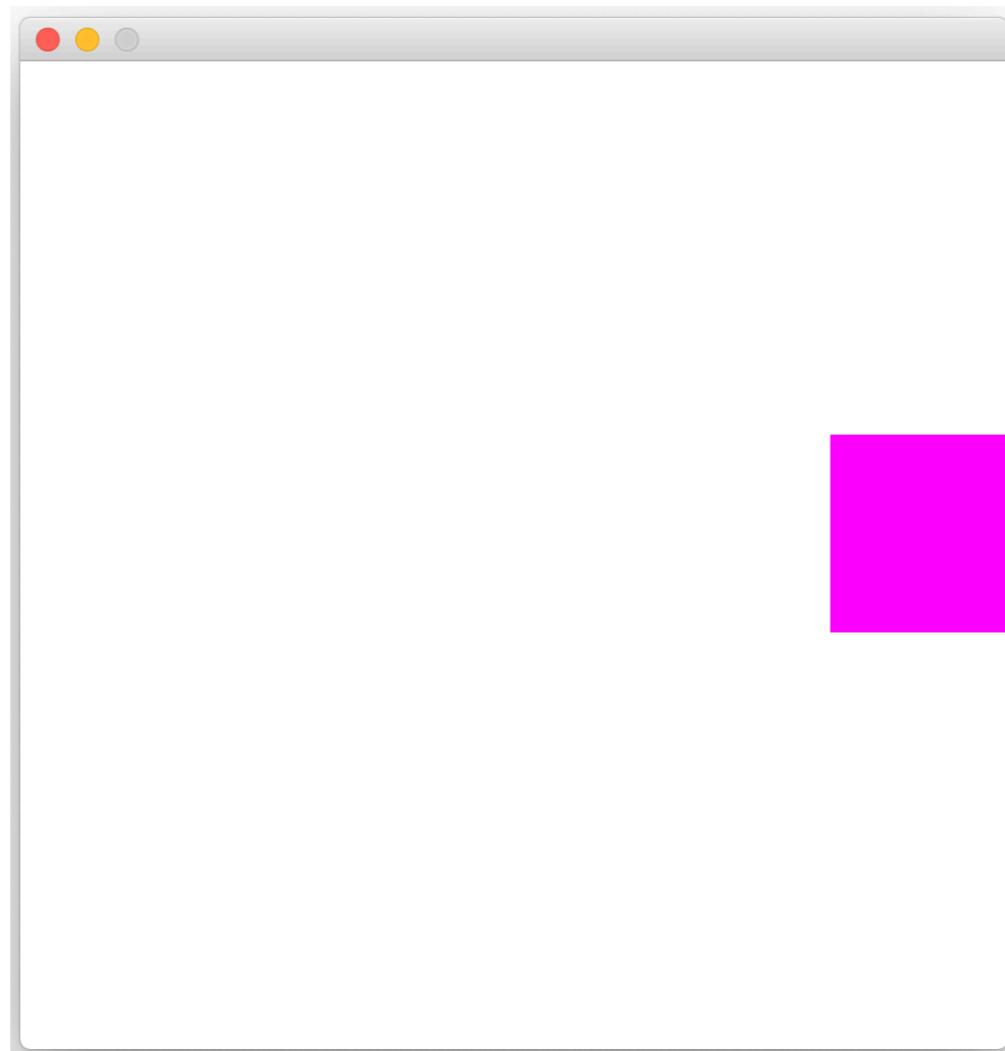
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
    pause(10)
```



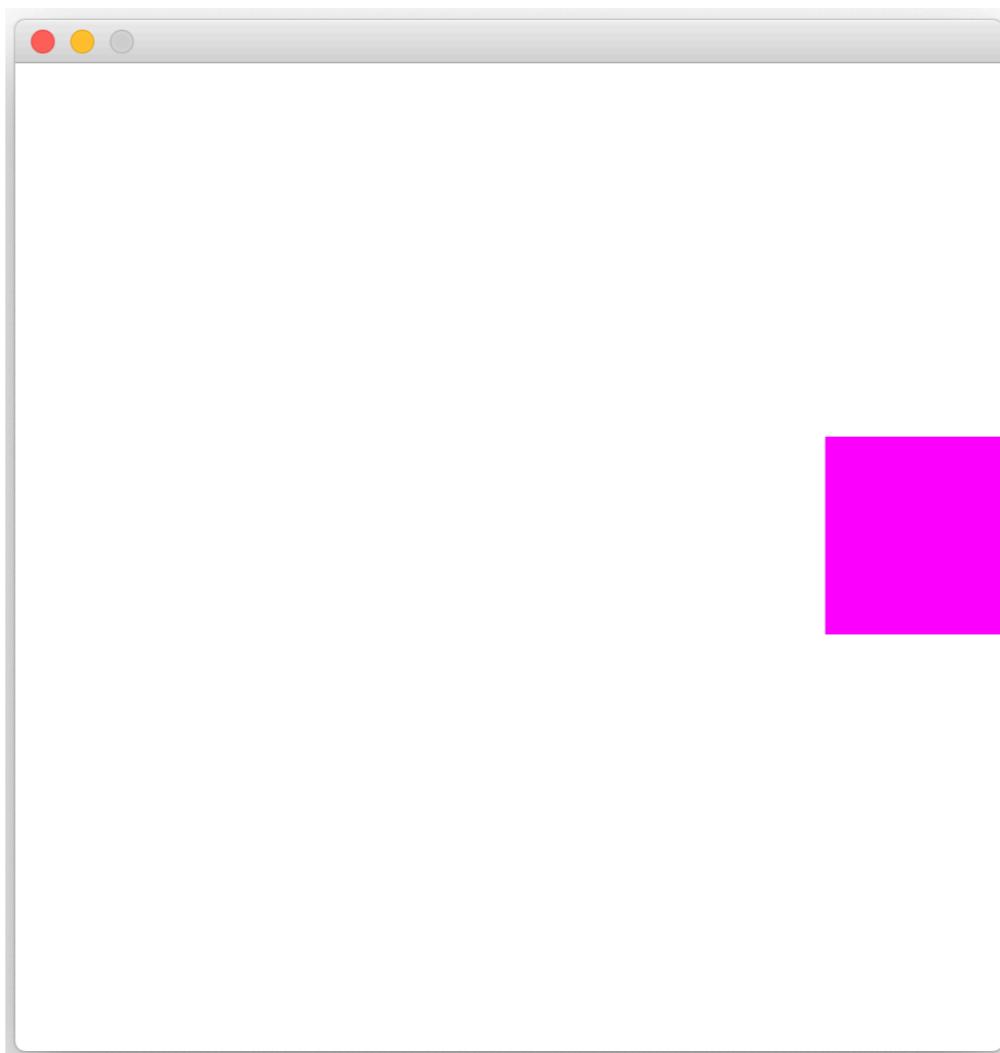
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
    pause(10)
```



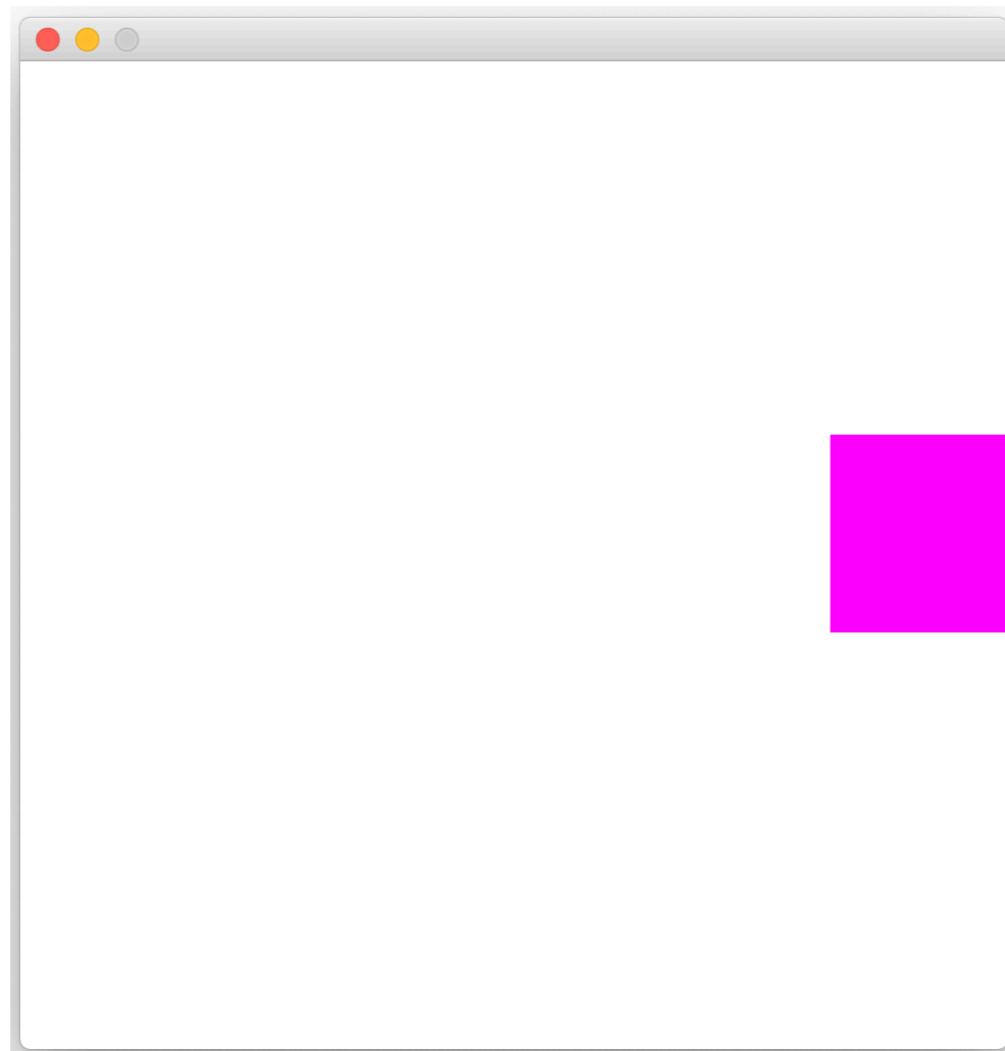
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



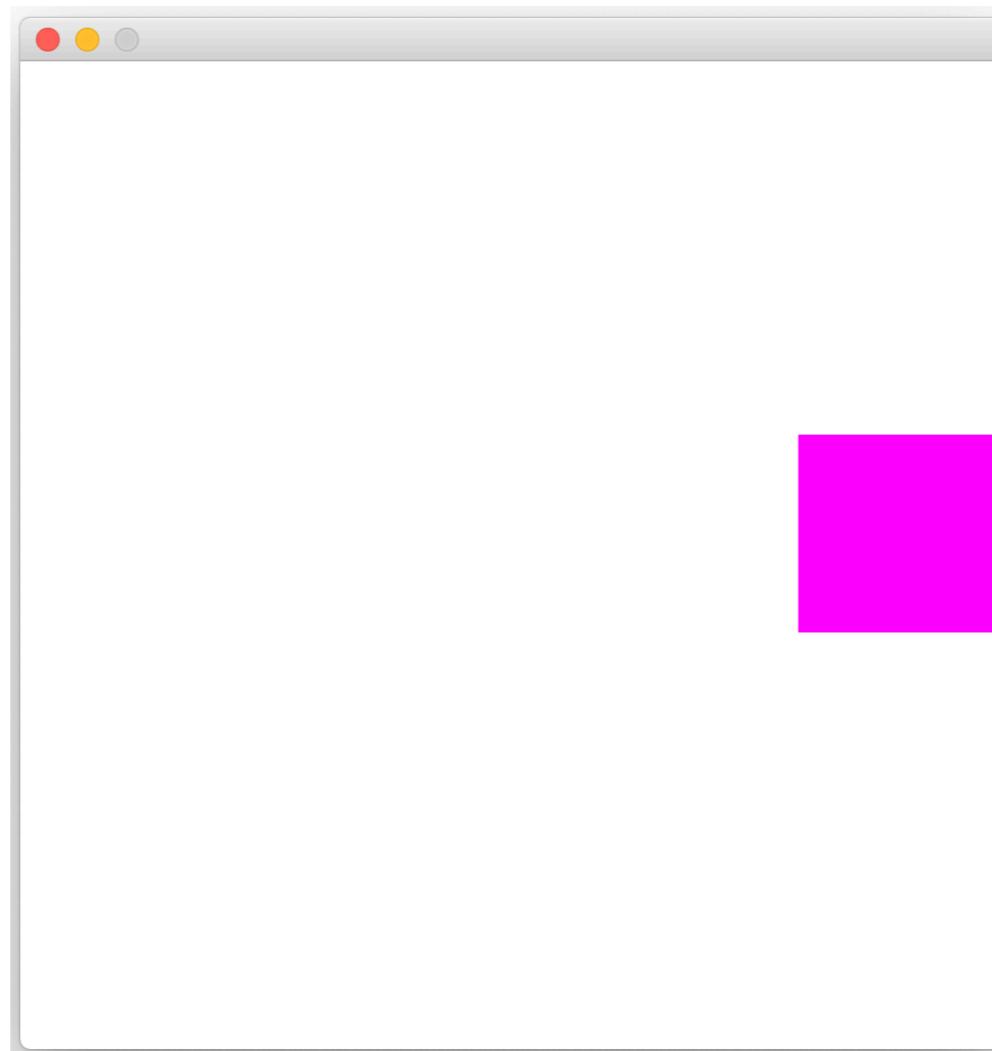
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
    pause(10)
```



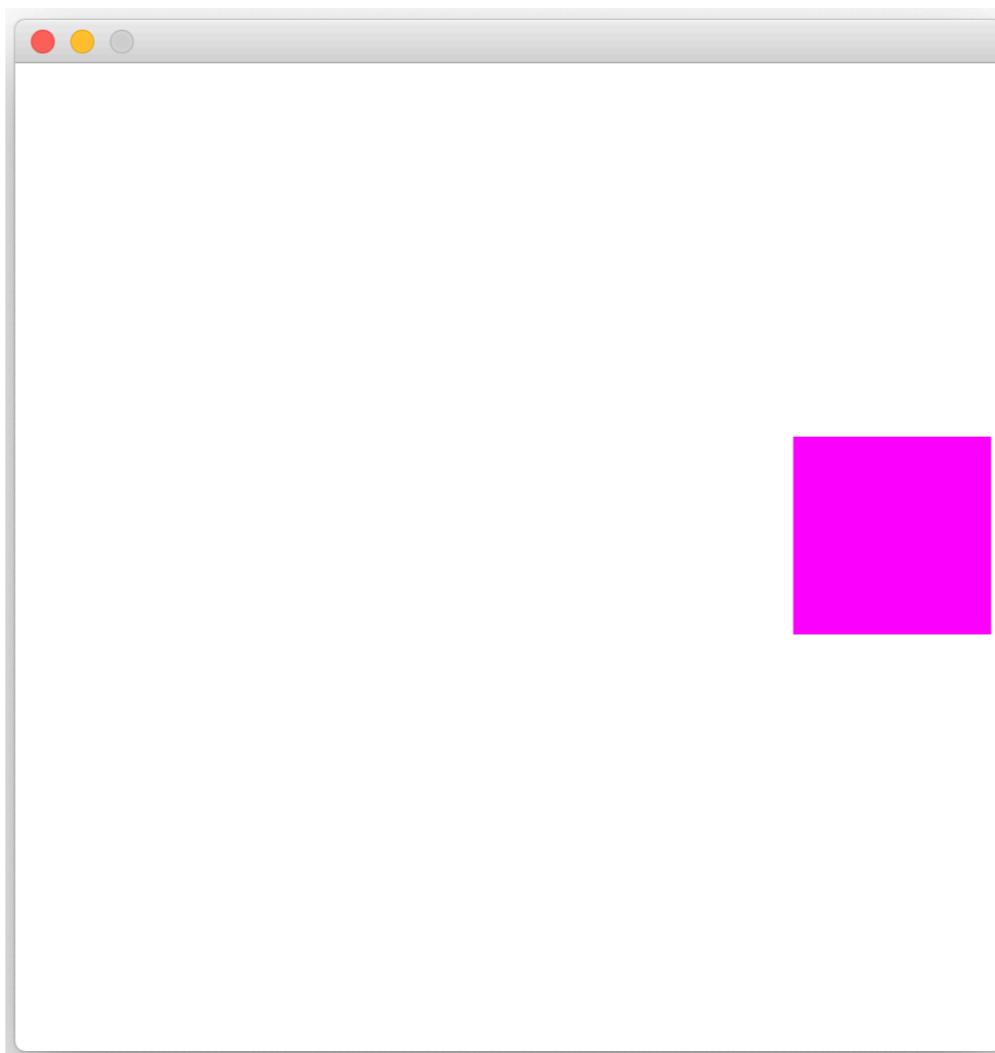
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



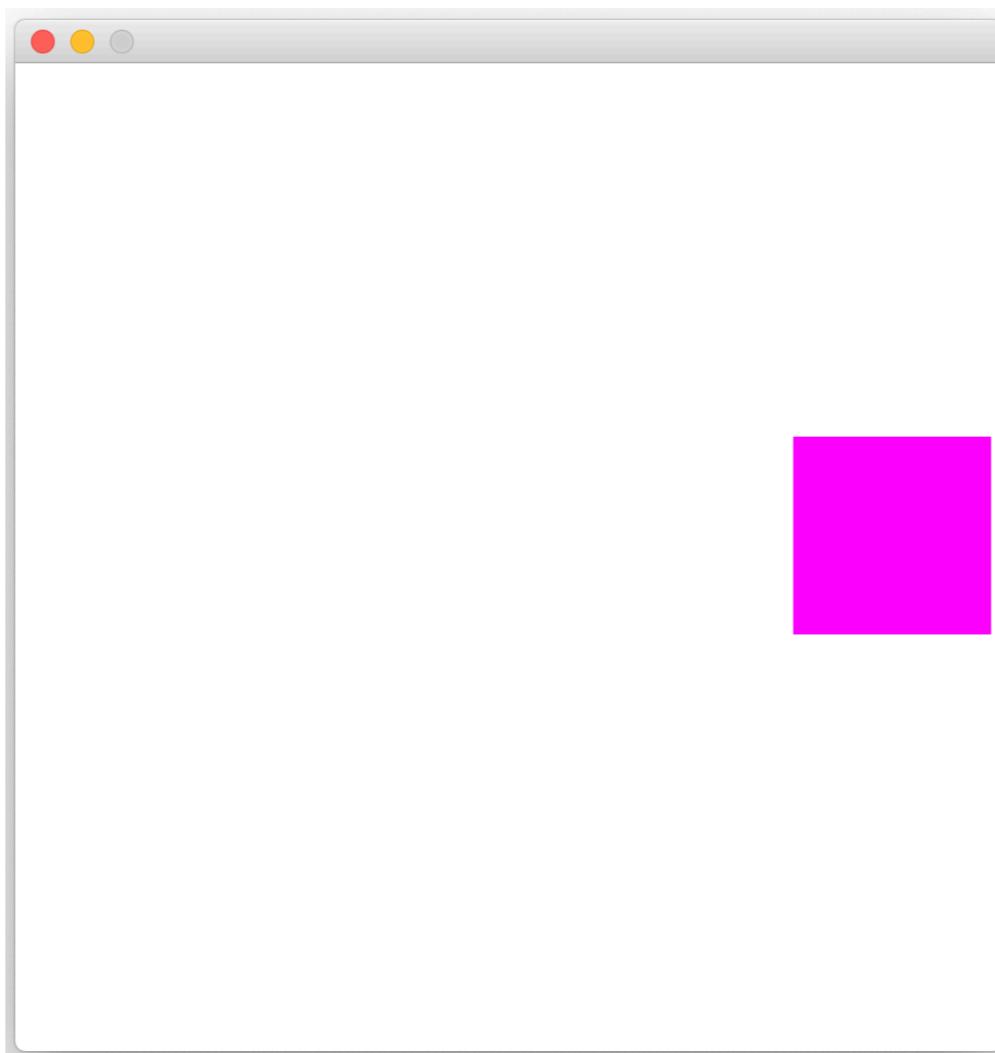
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



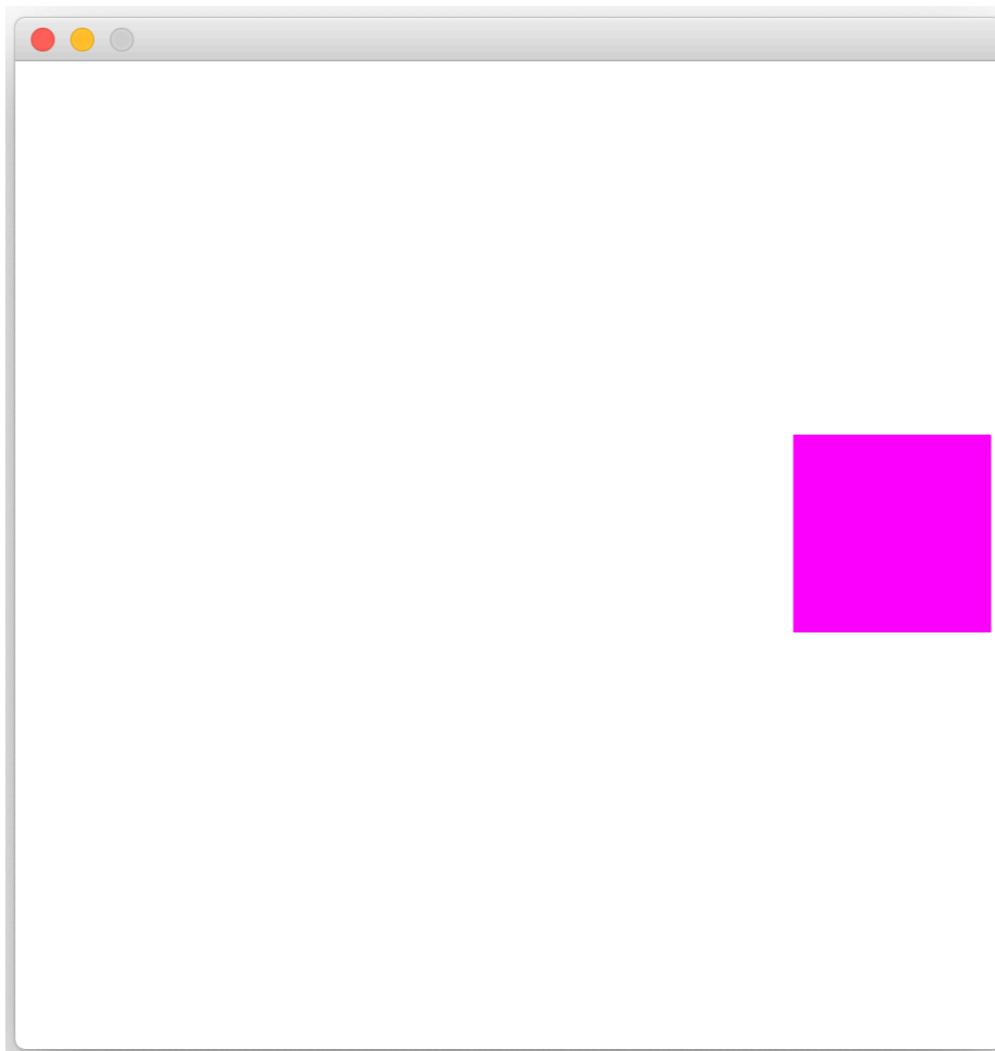
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



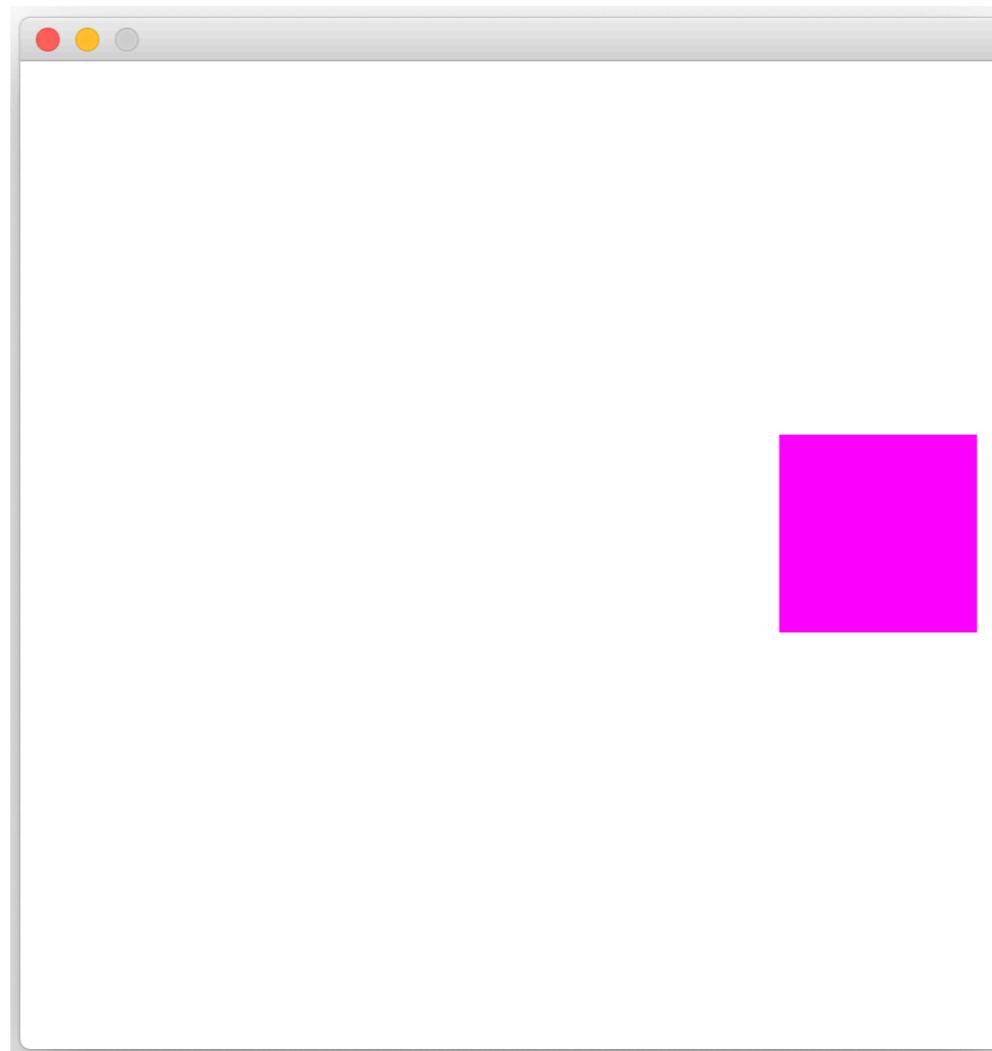
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
    pause(10)
```



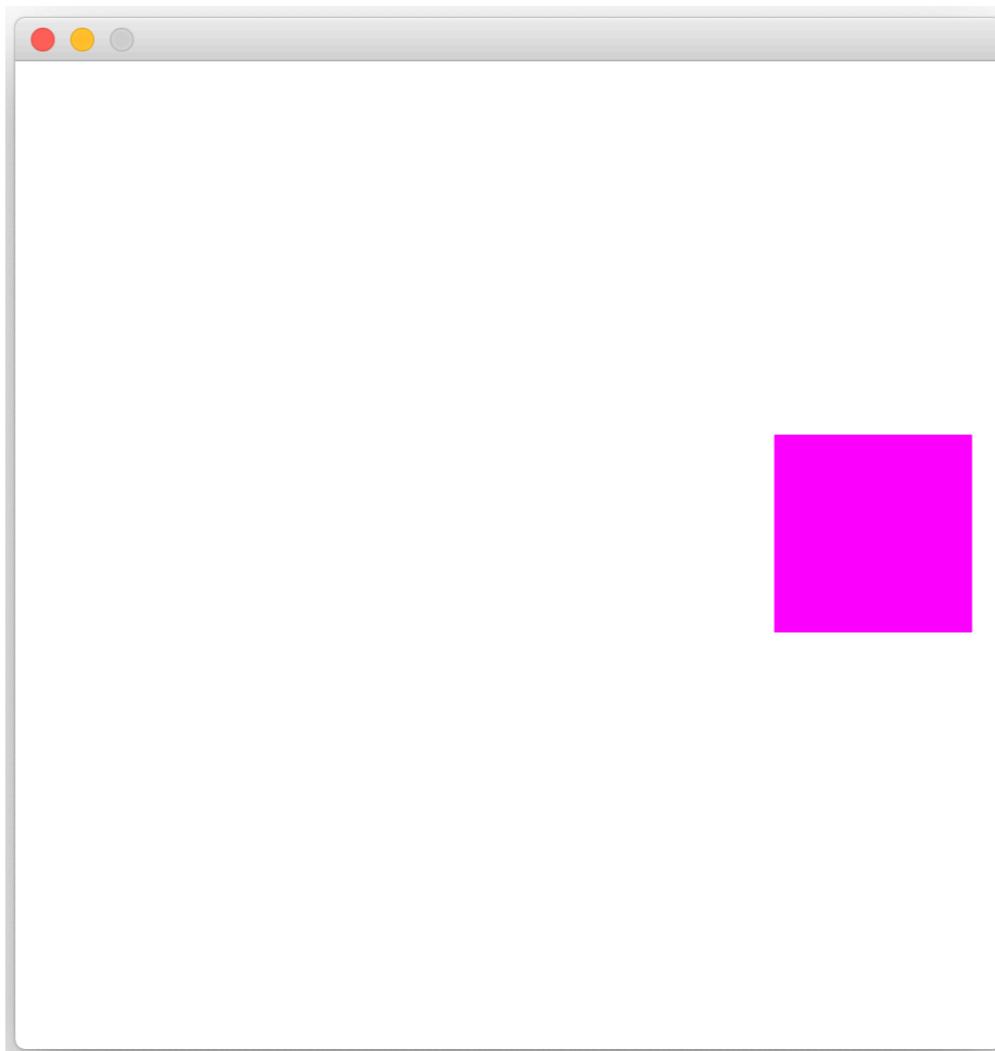
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



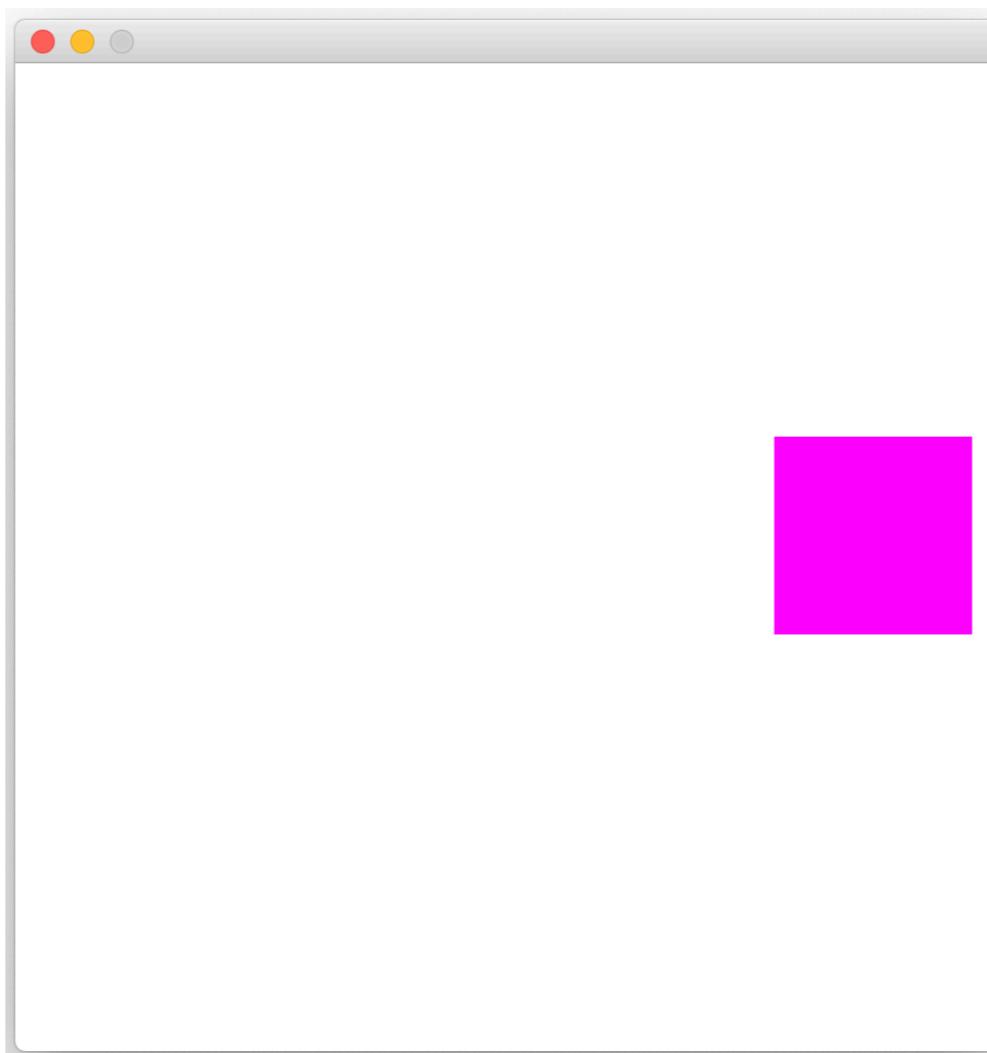
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



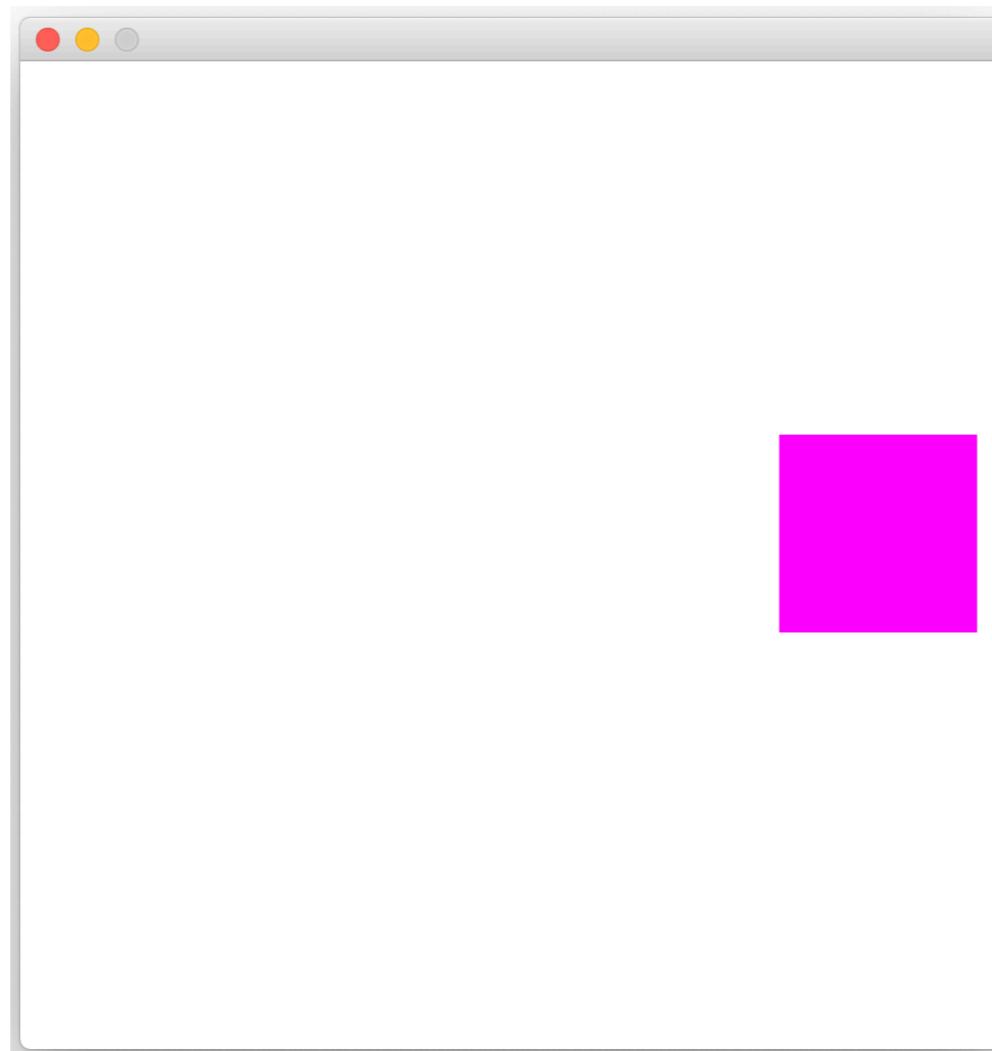
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



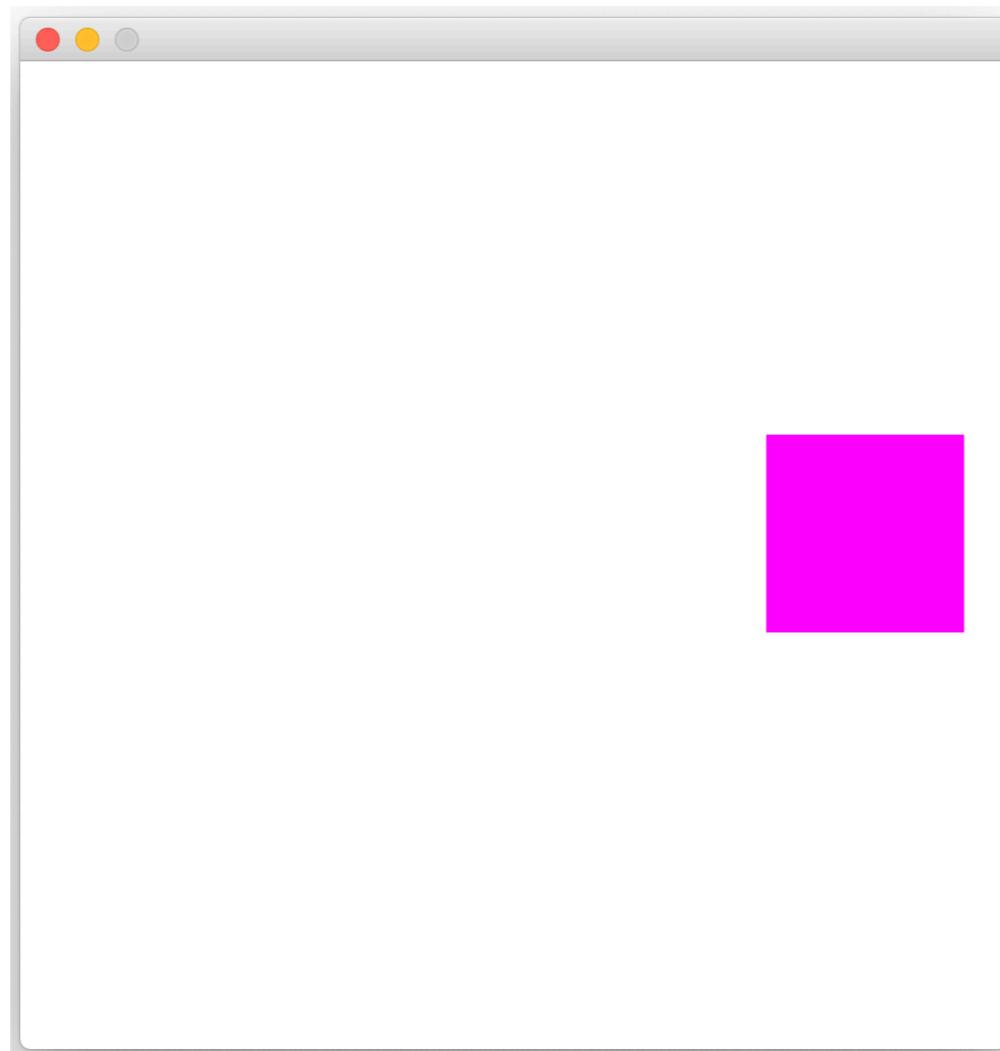
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
    pause(10)
```



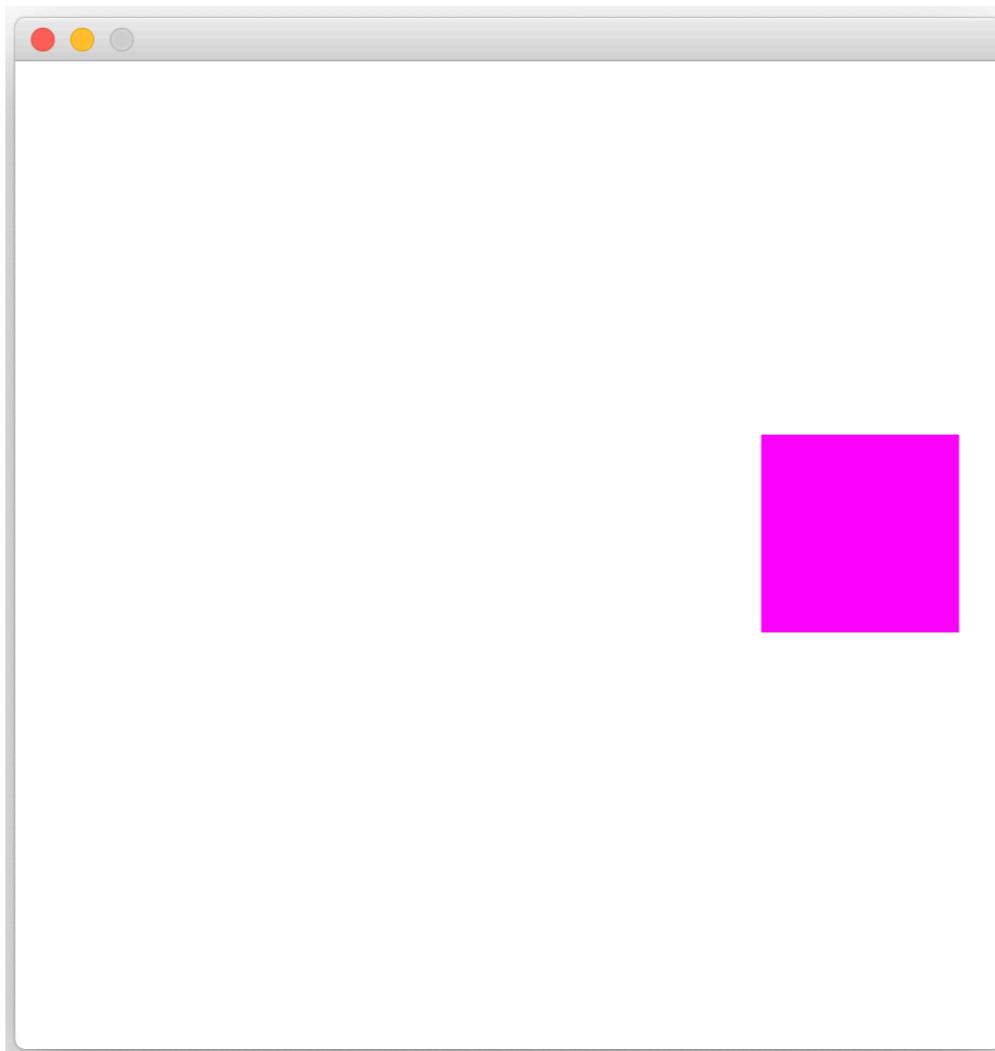
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



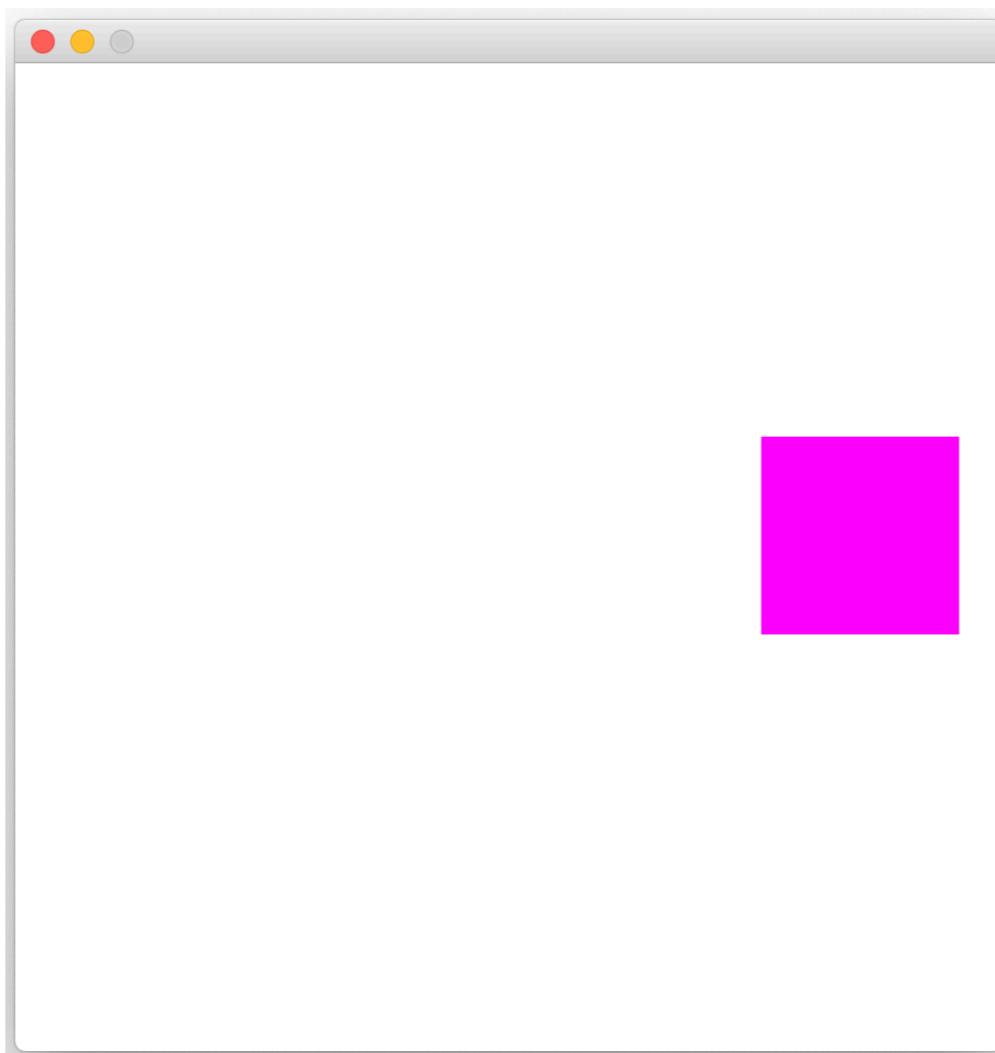
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



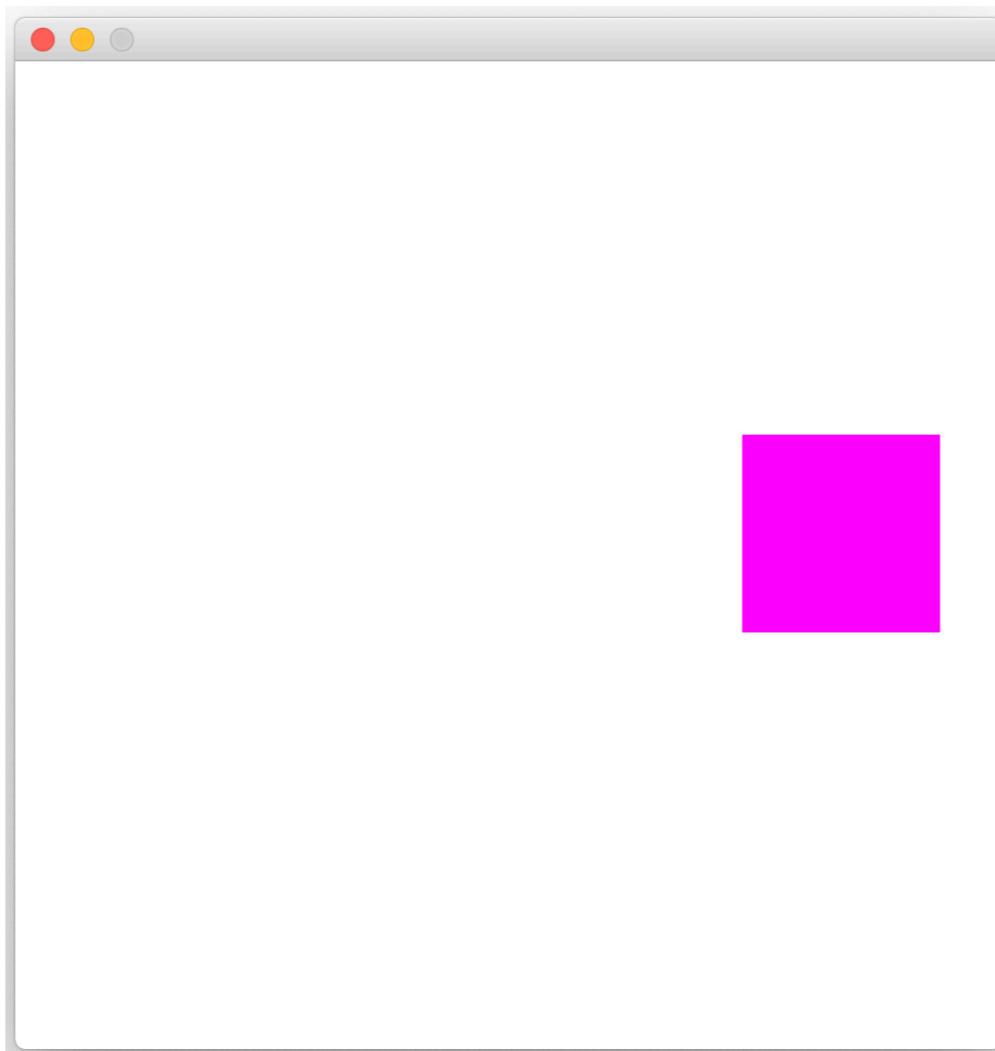
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



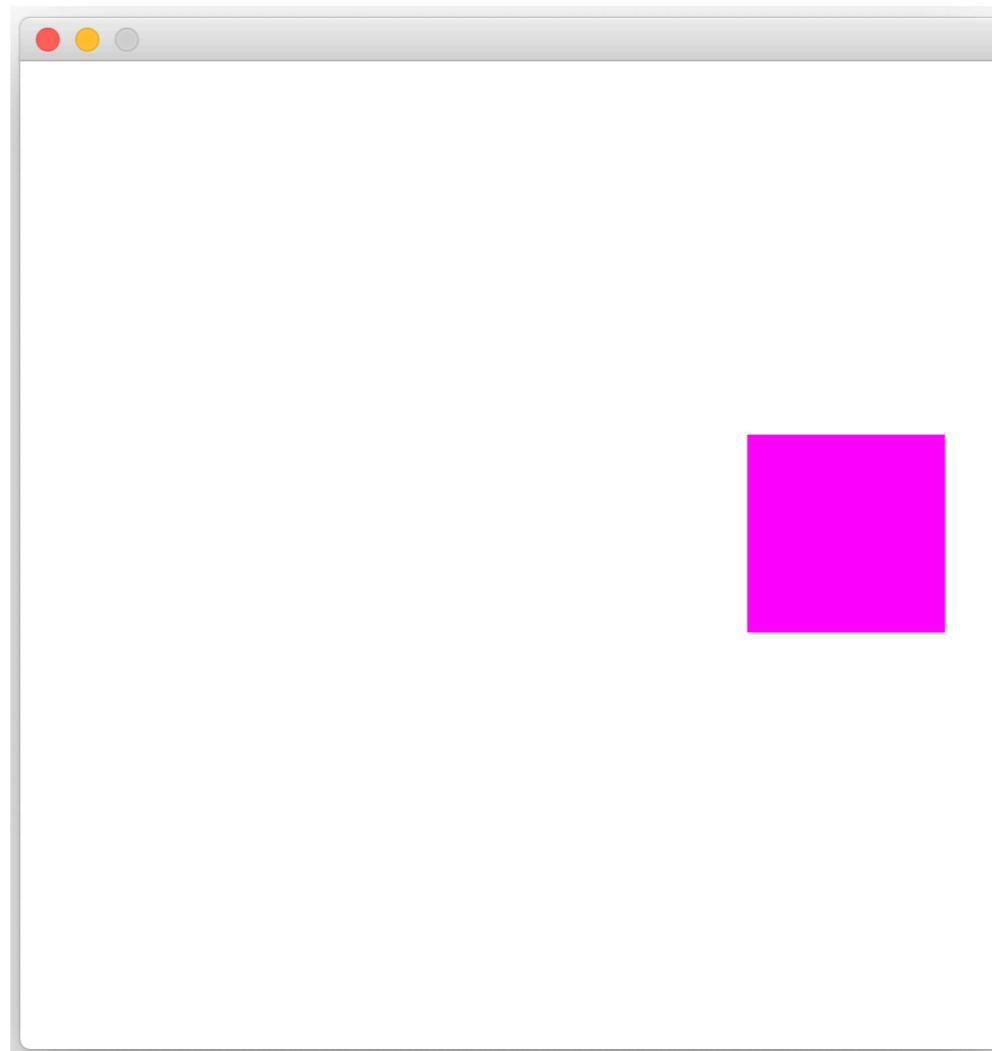
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
    pause(10)
```



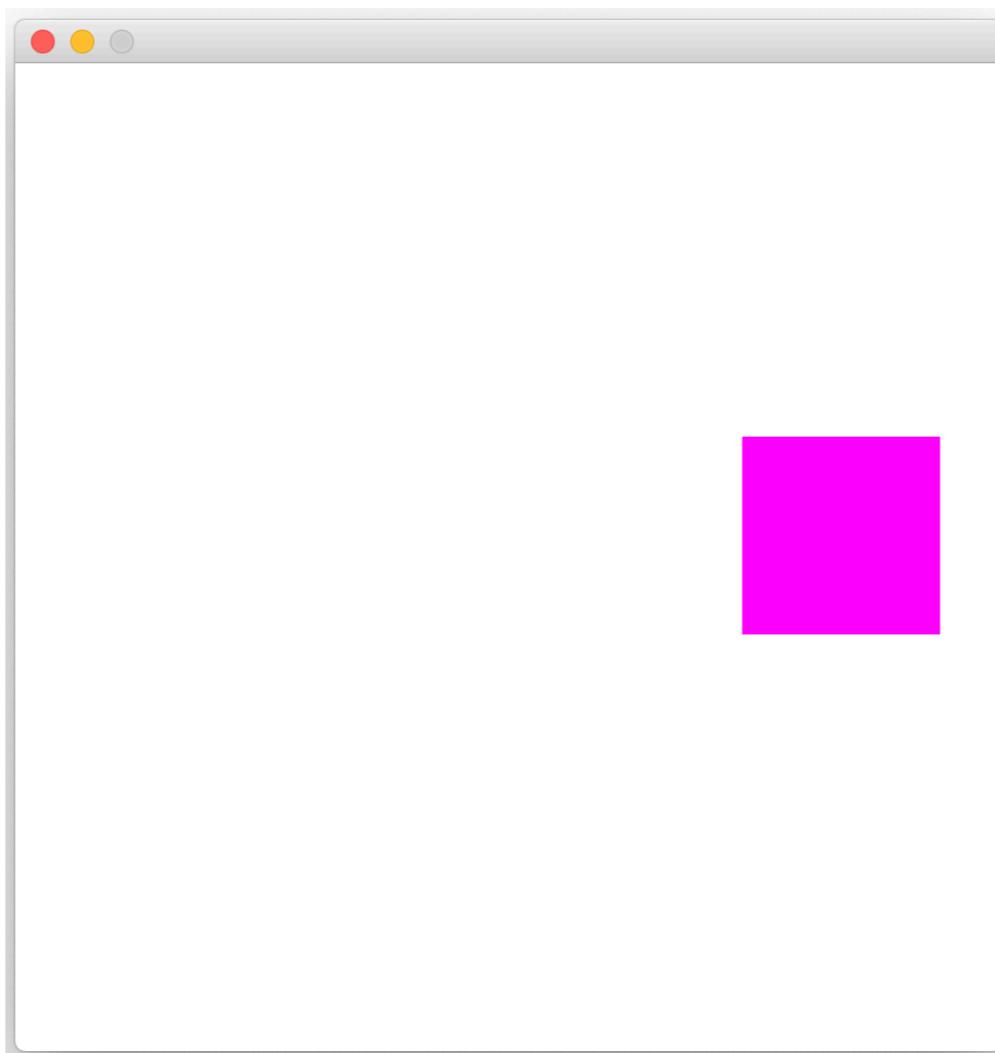
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



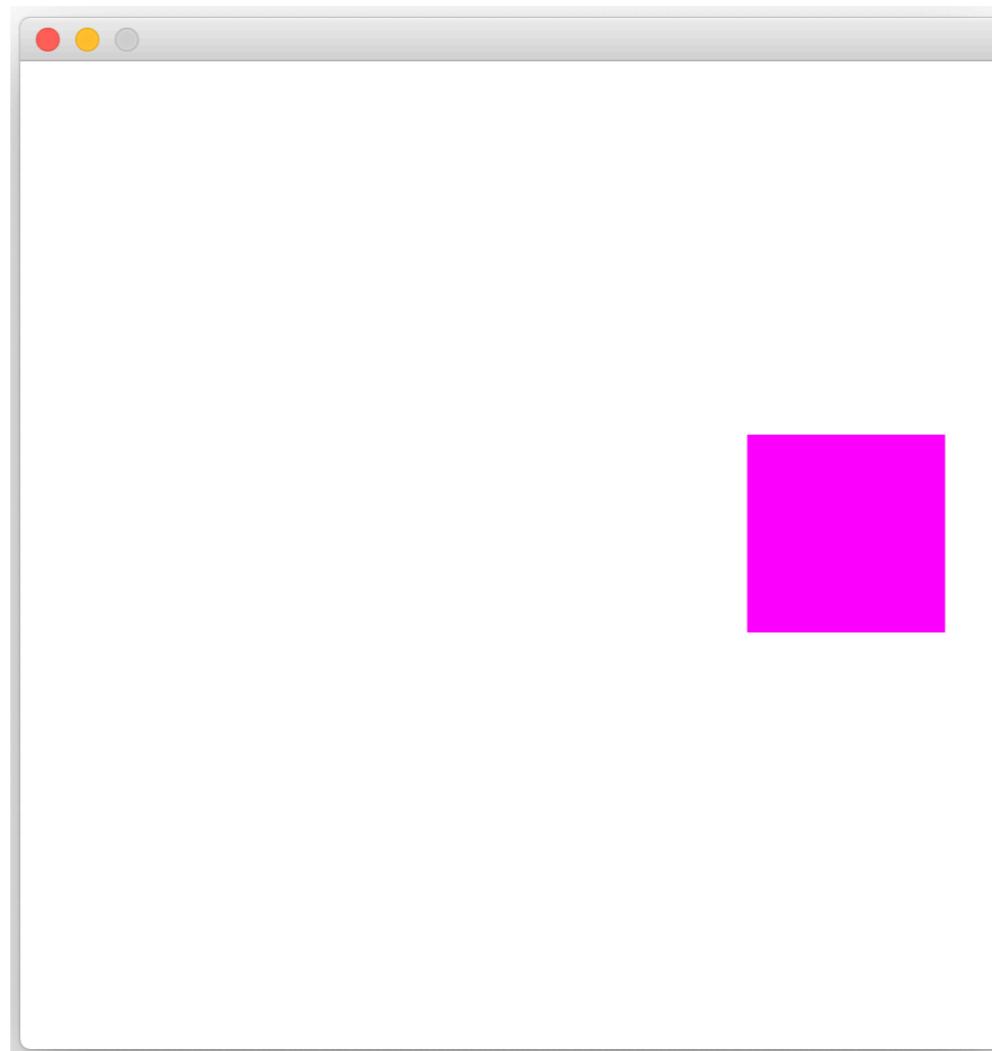
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



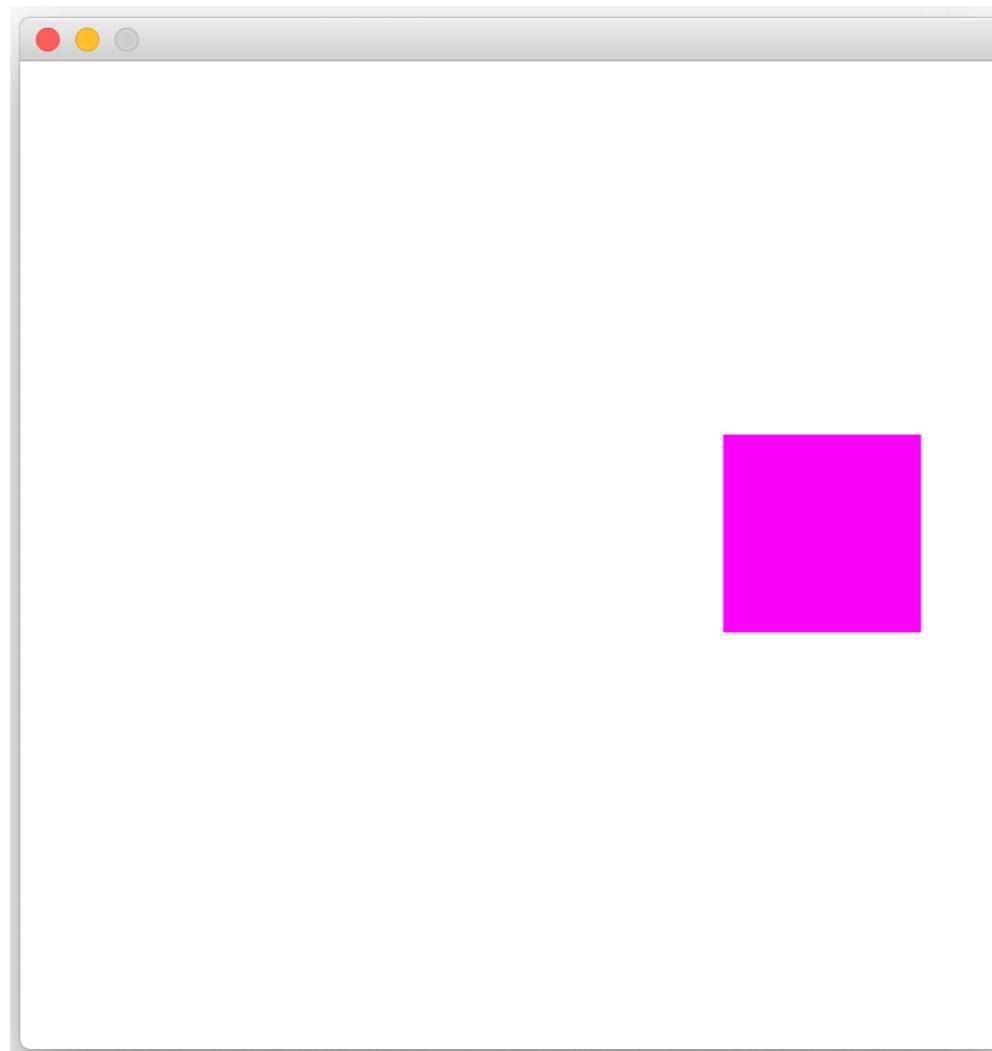
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
    pause(10)
```



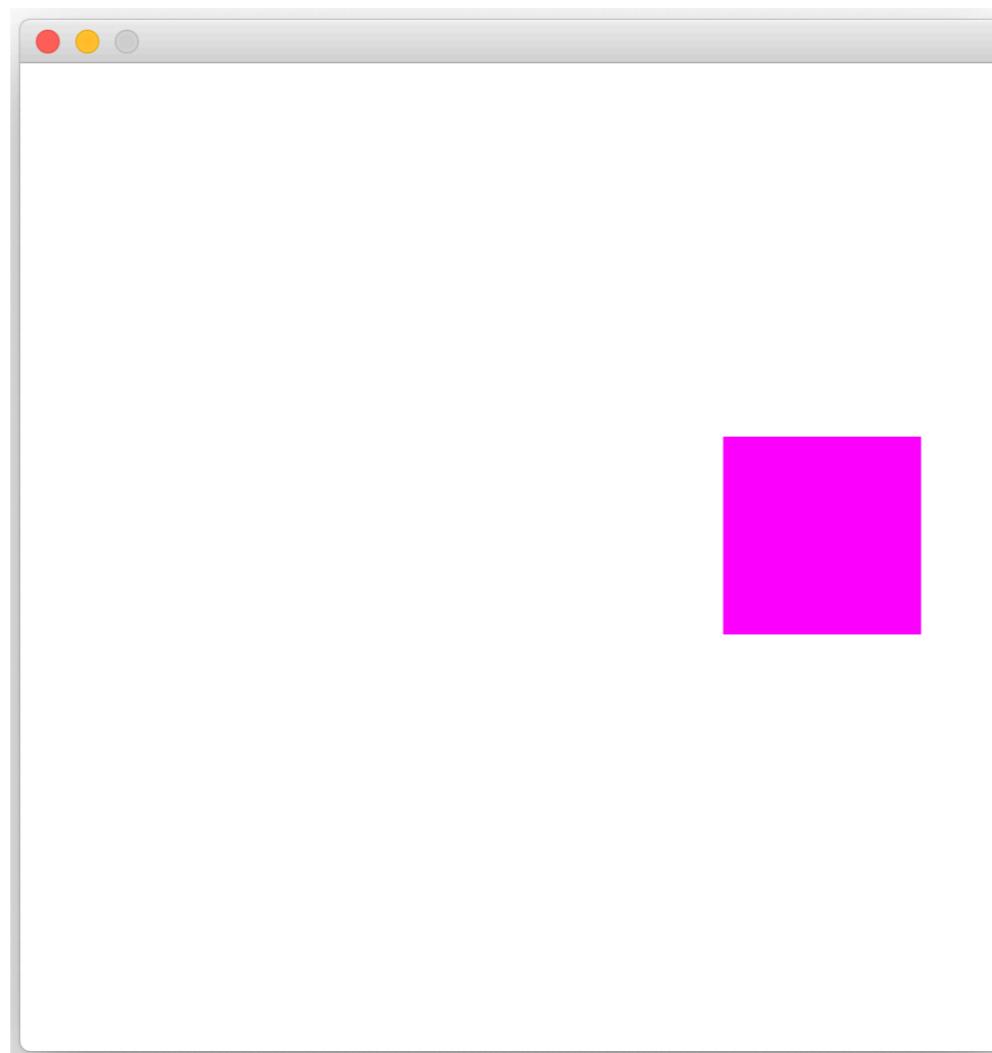
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



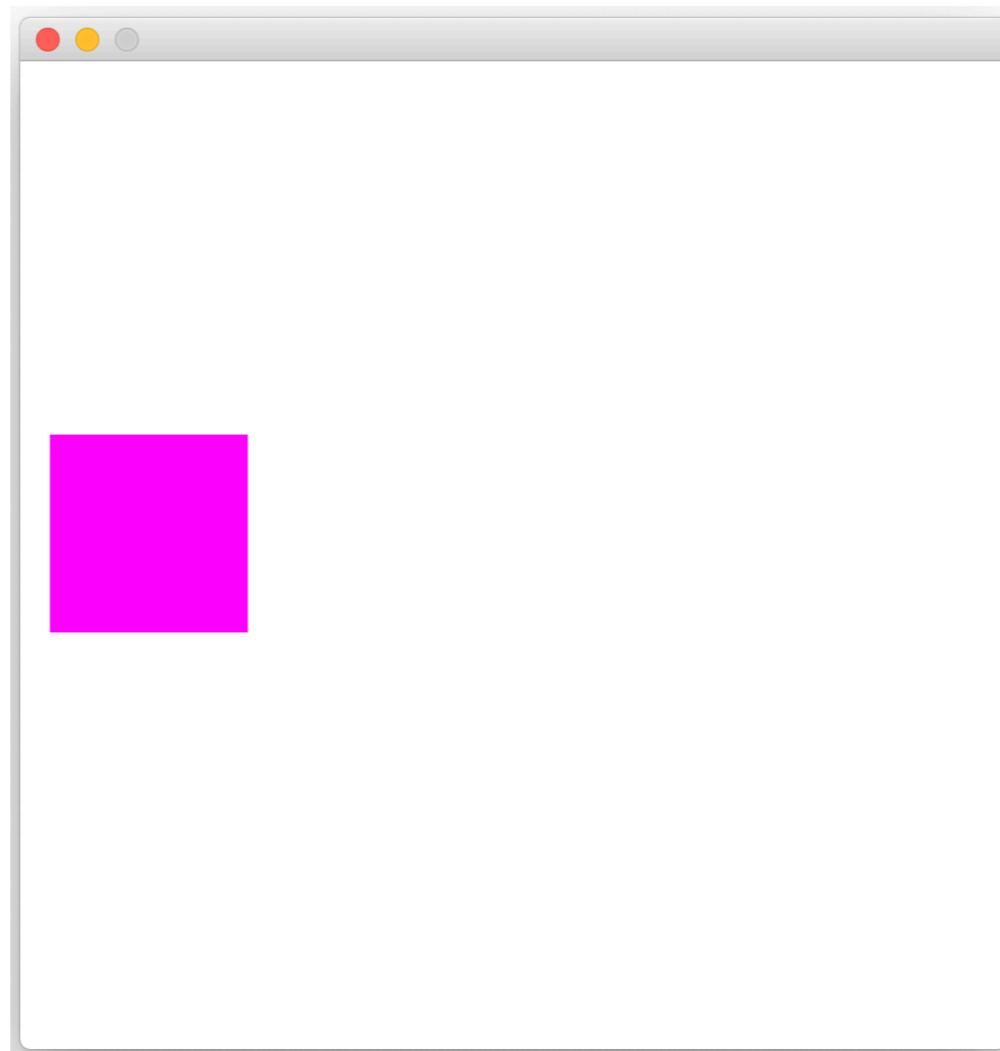
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



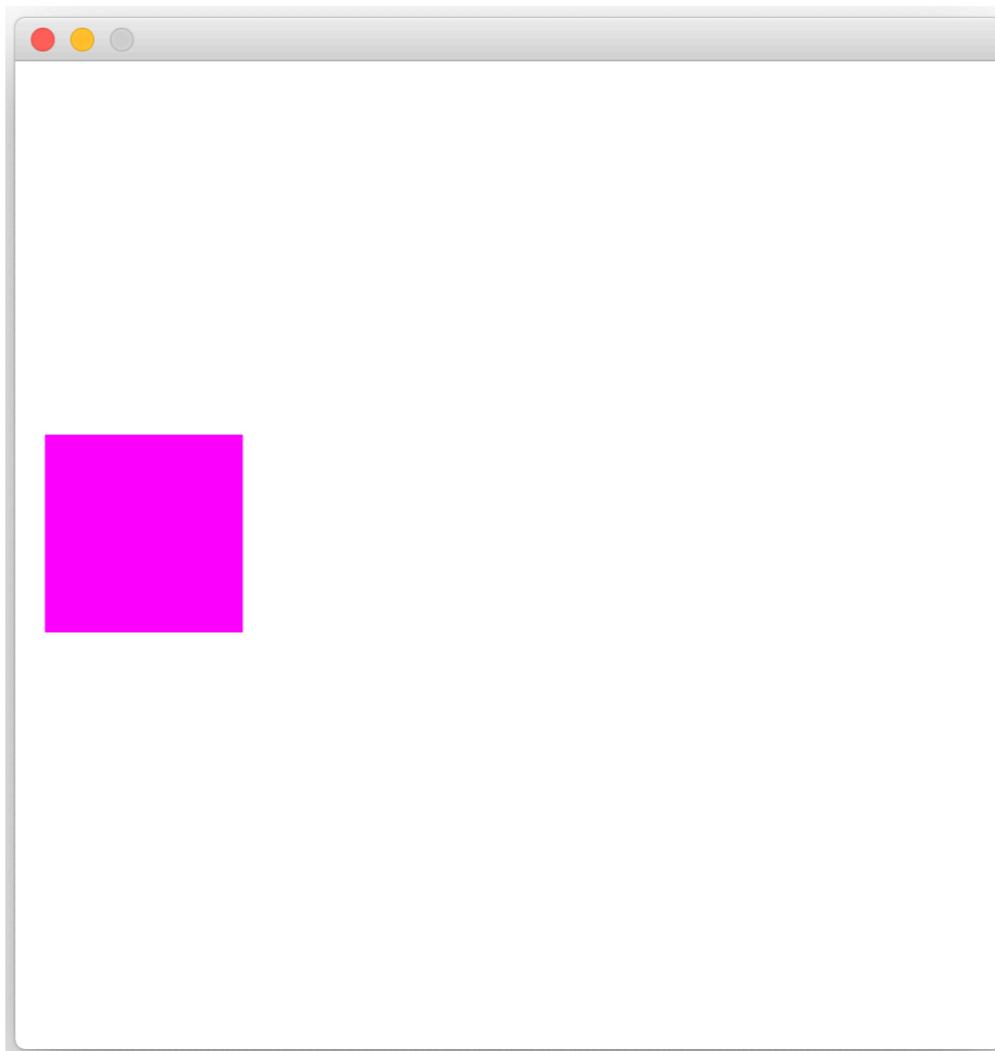
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
    pause(10)
```



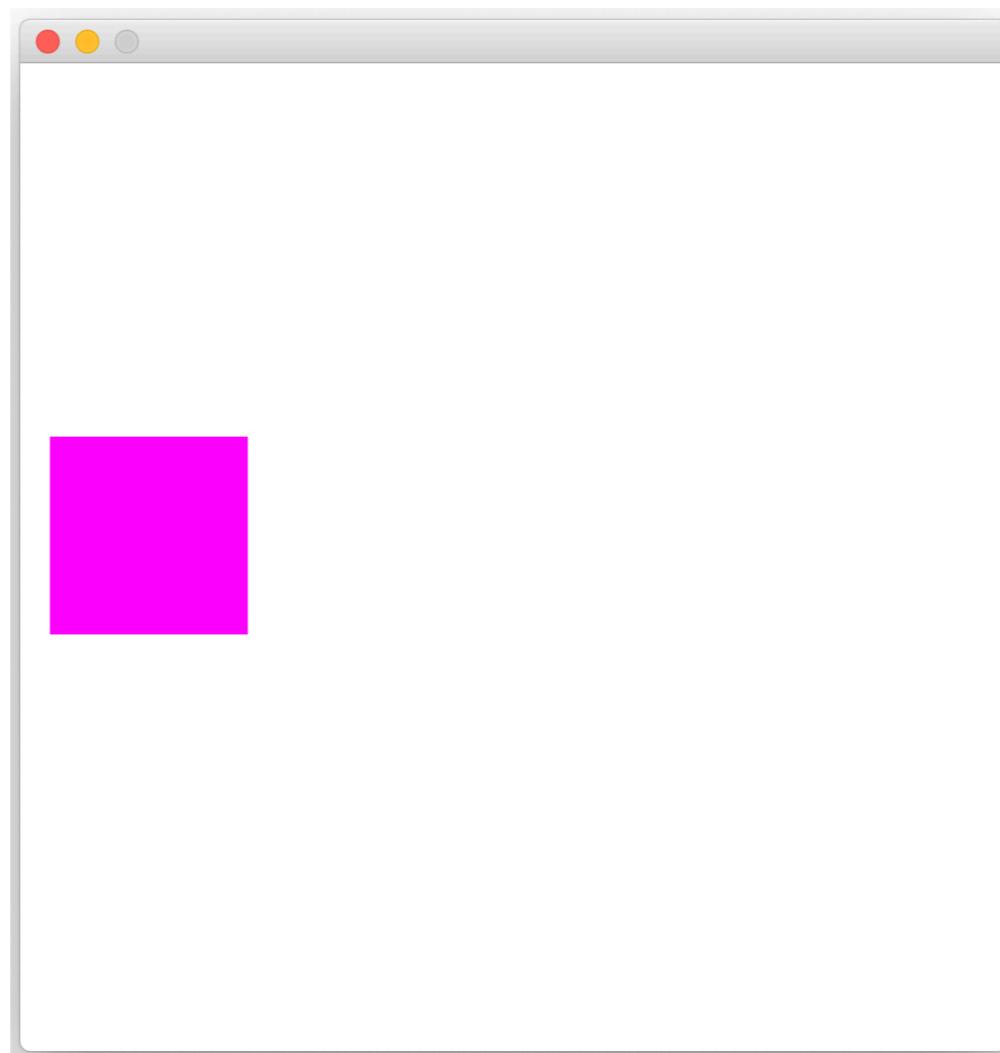
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



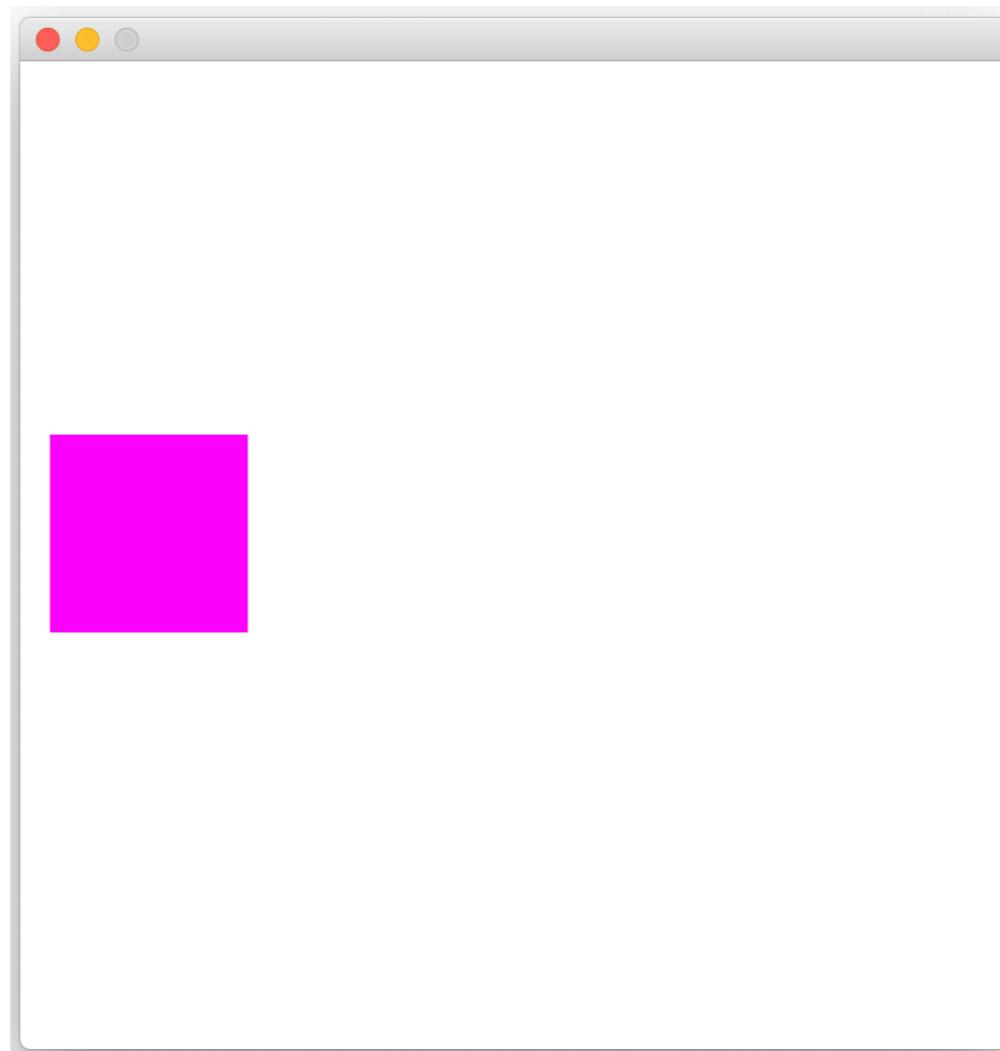
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



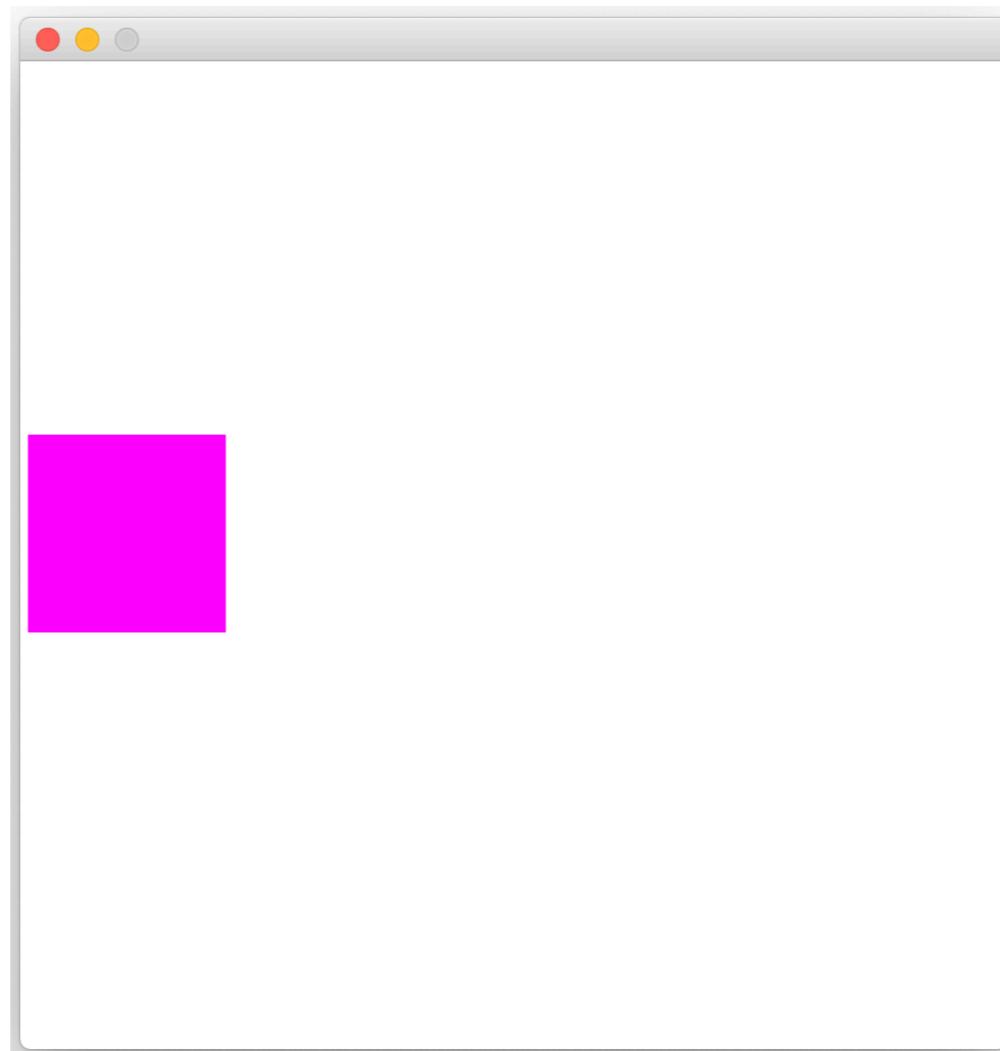
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
    pause(10)
```



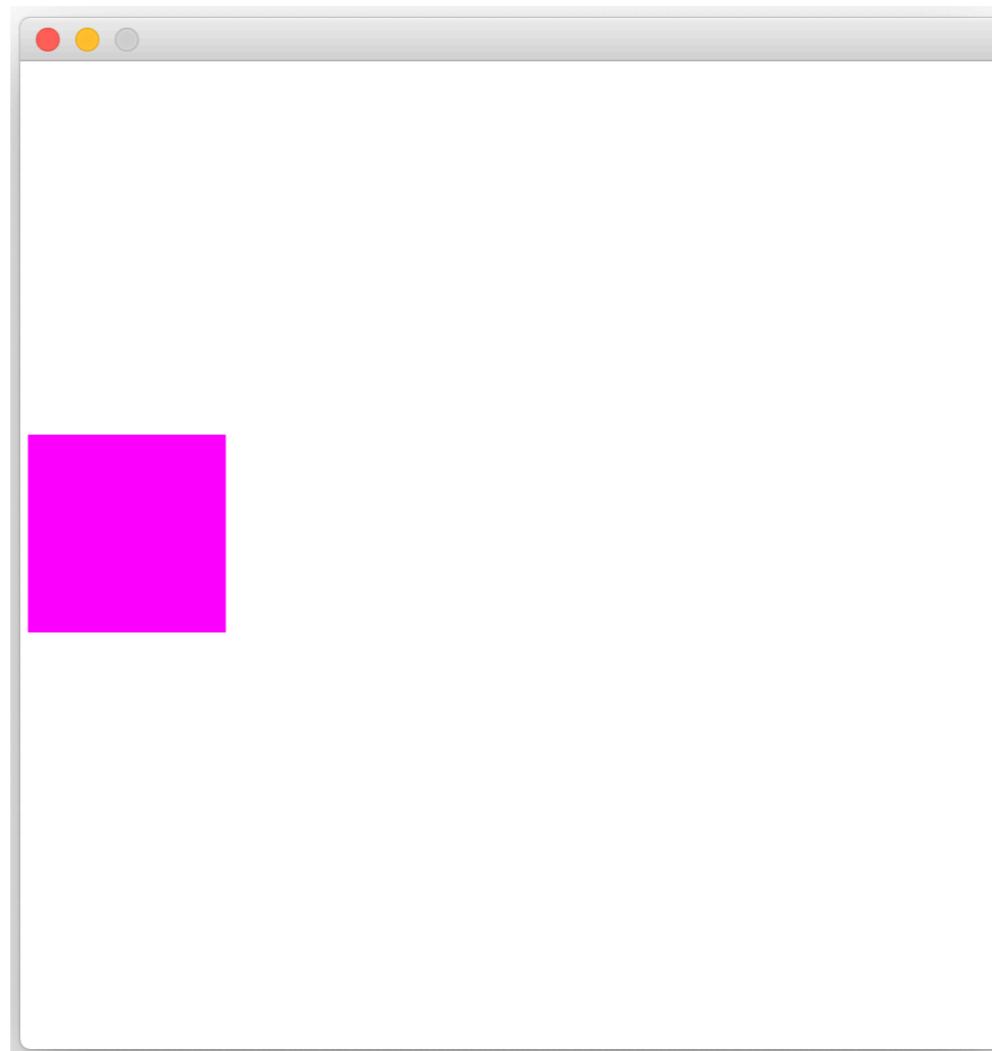
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



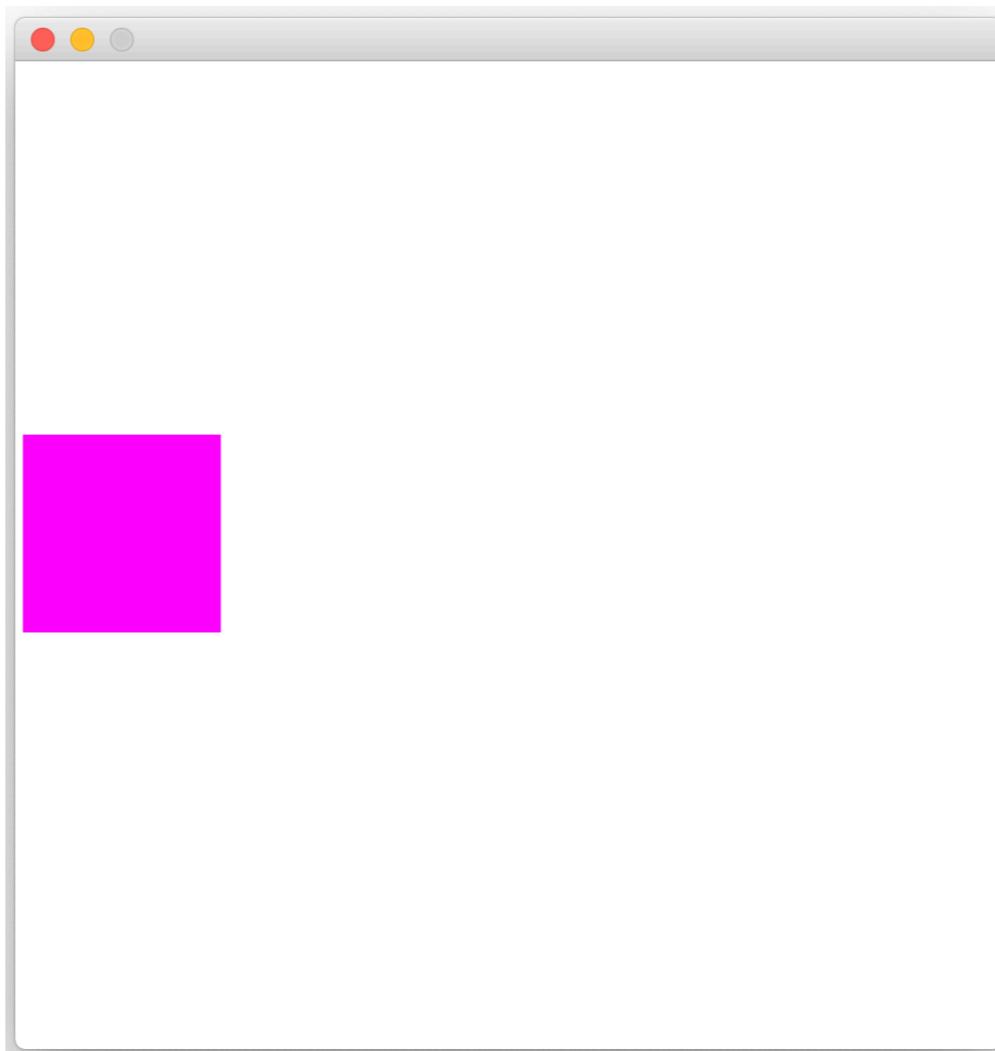
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



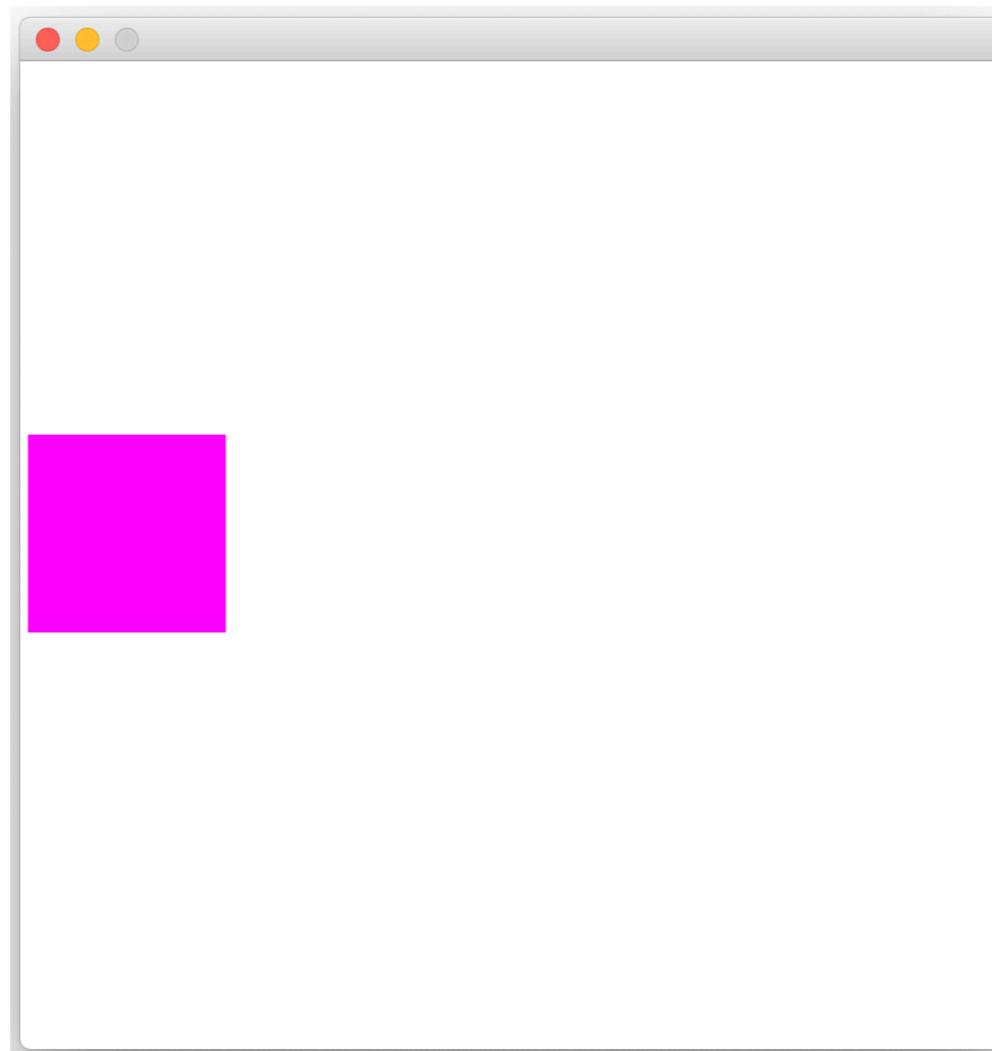
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



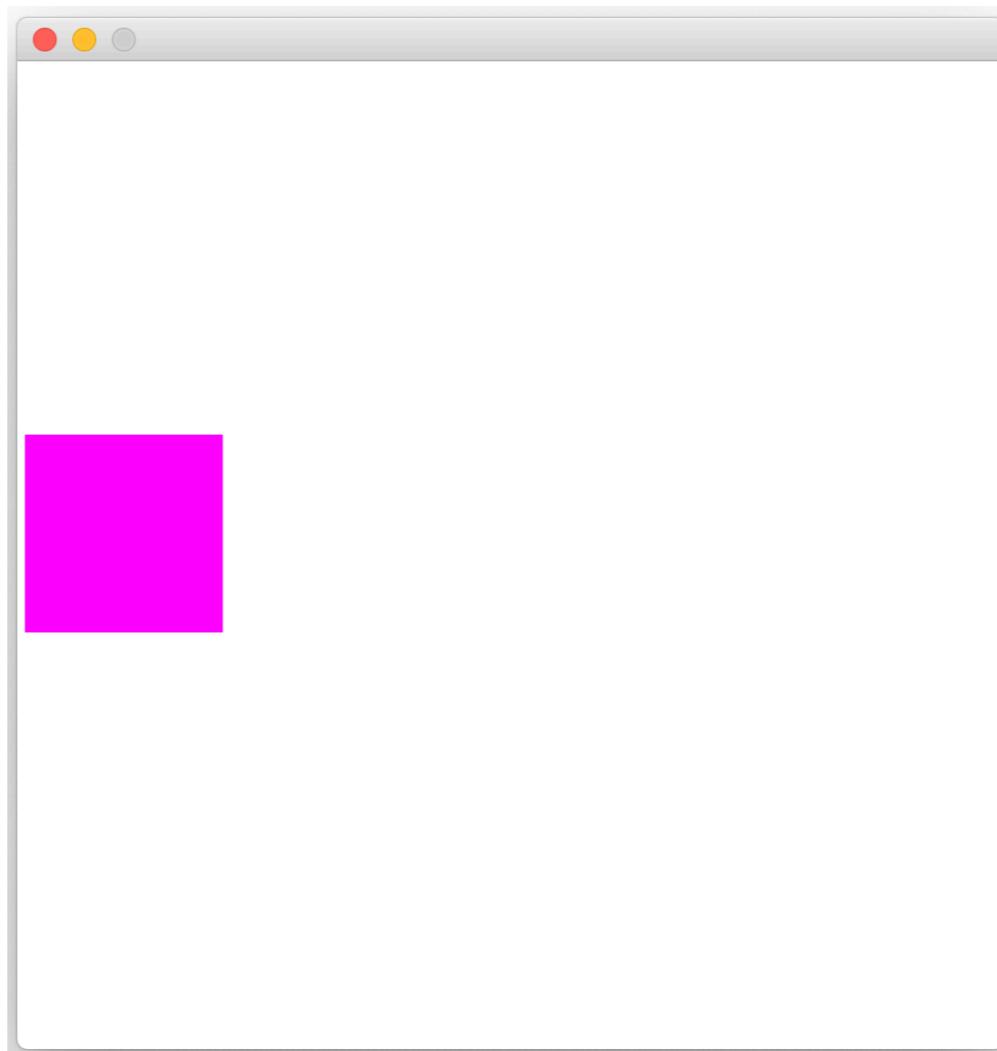
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



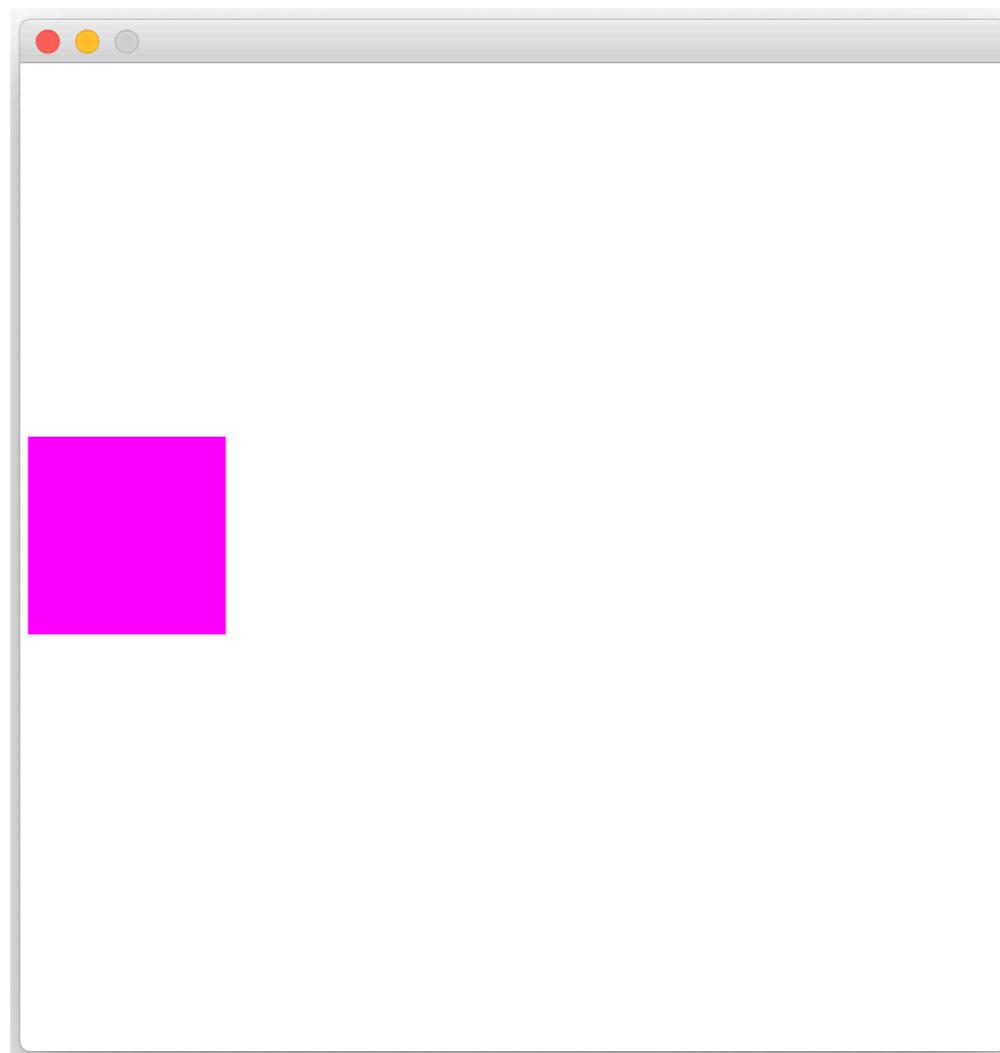
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



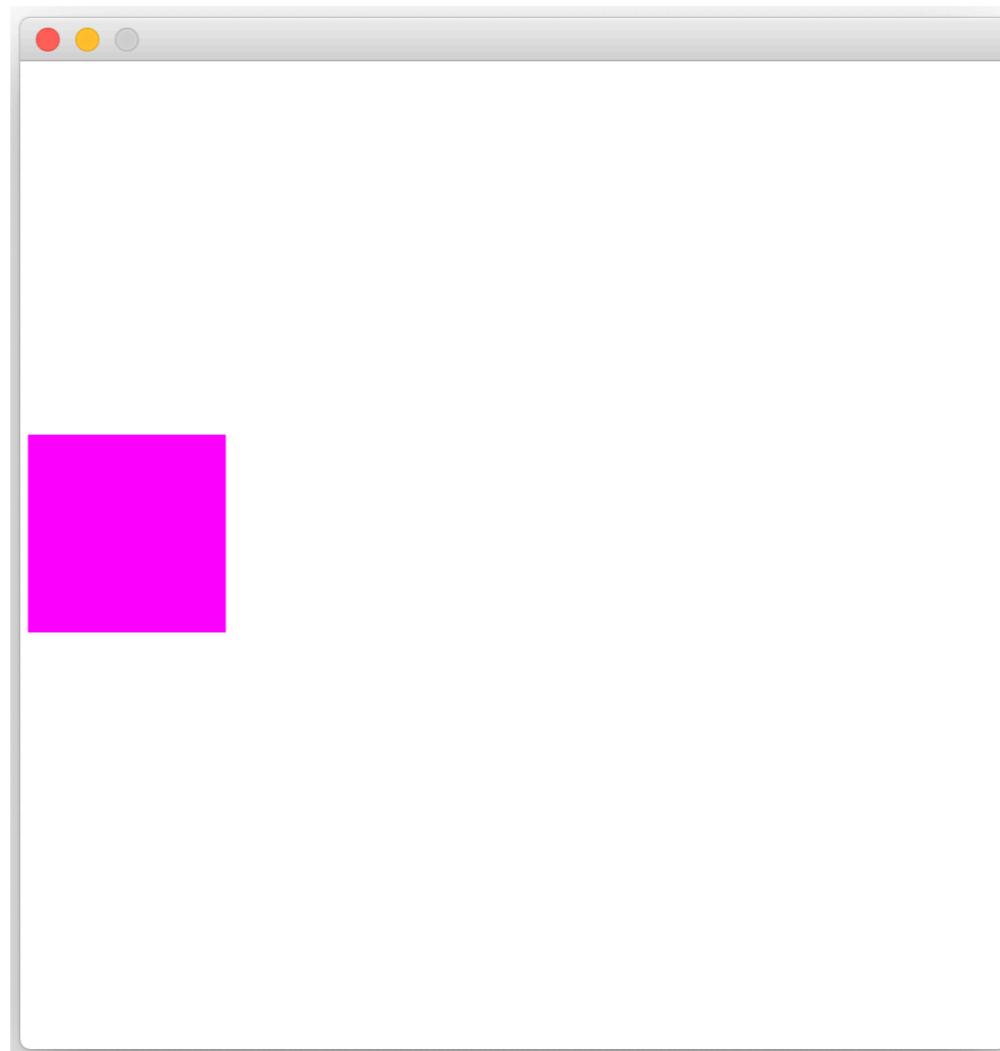
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



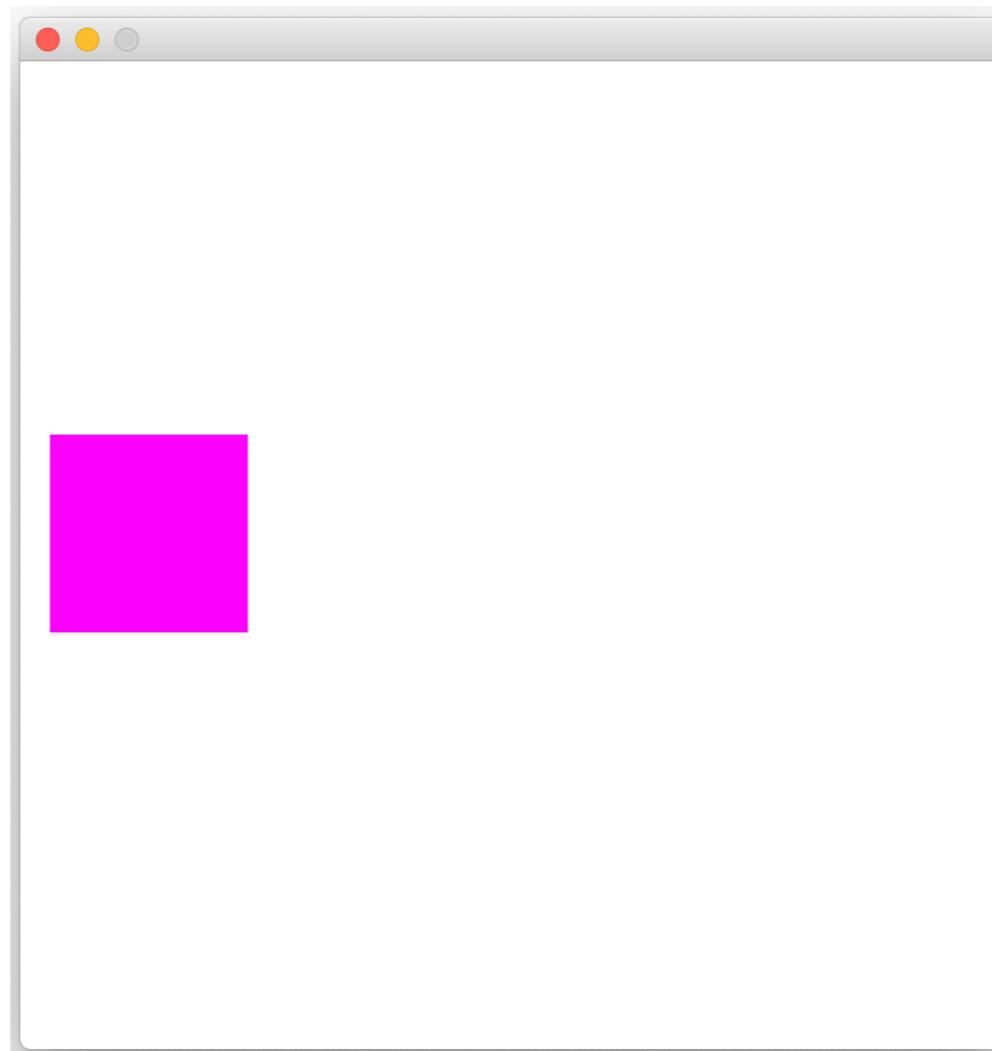
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



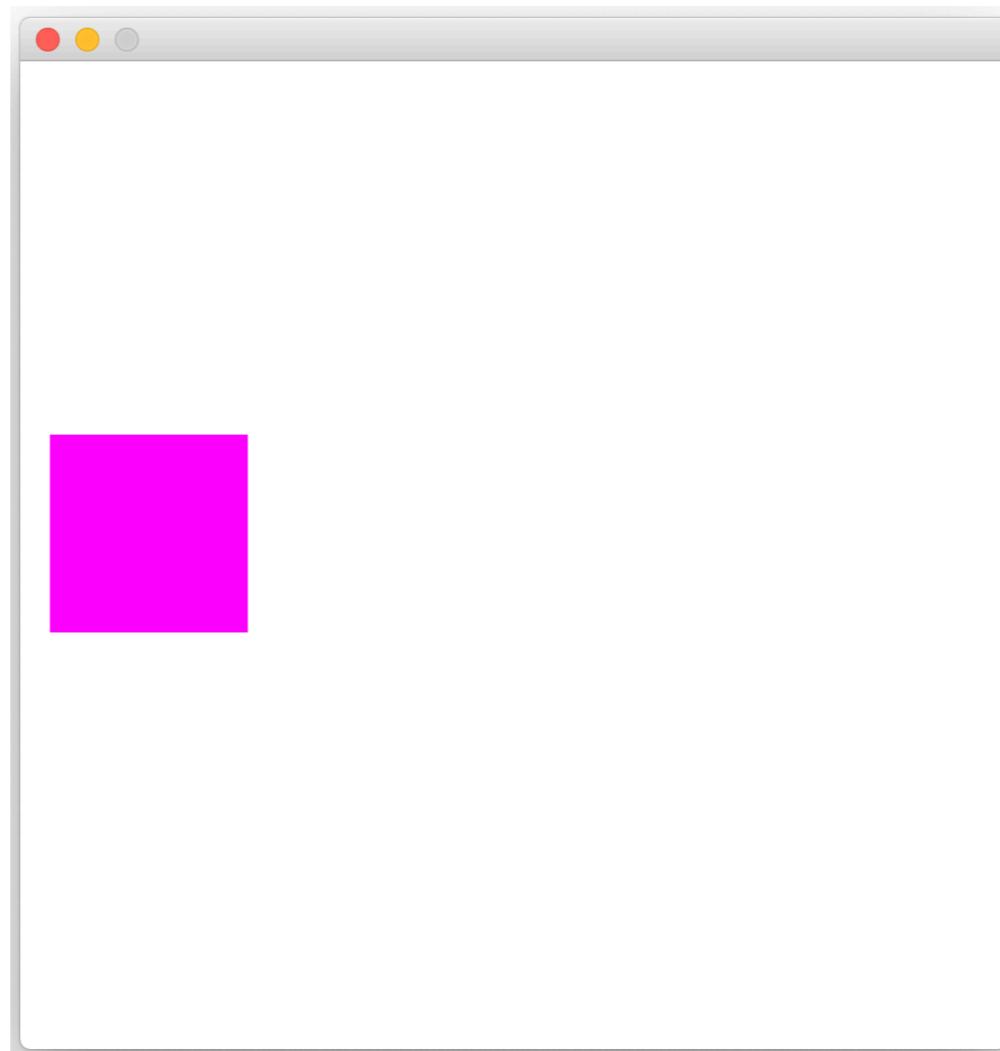
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



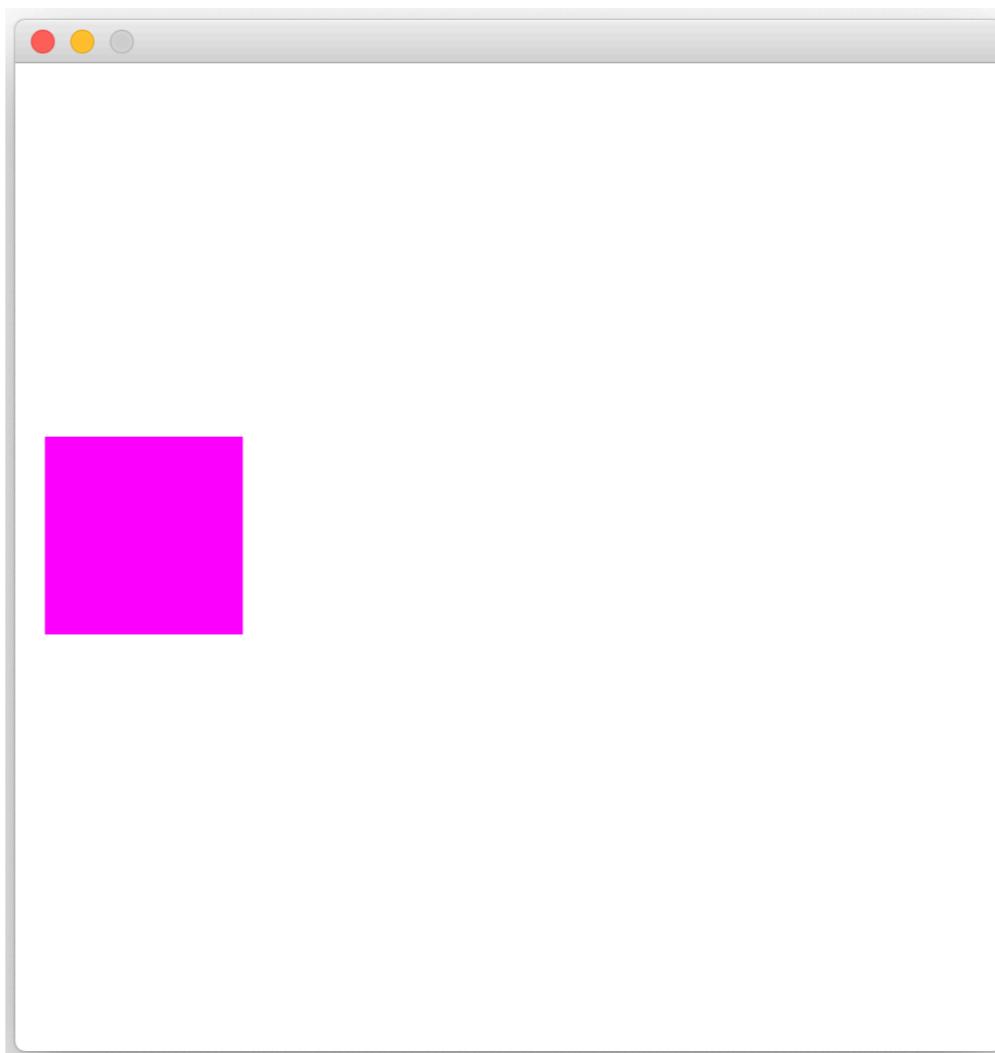
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



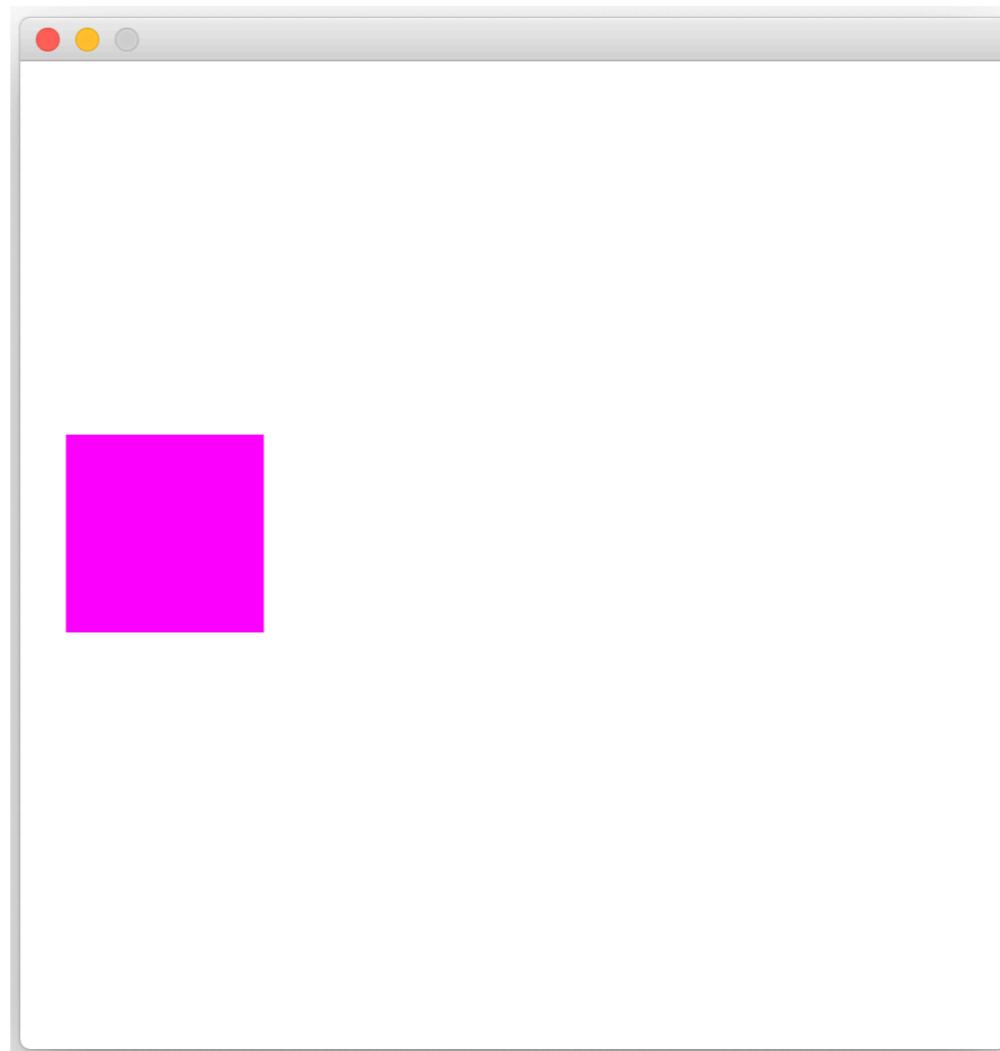
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



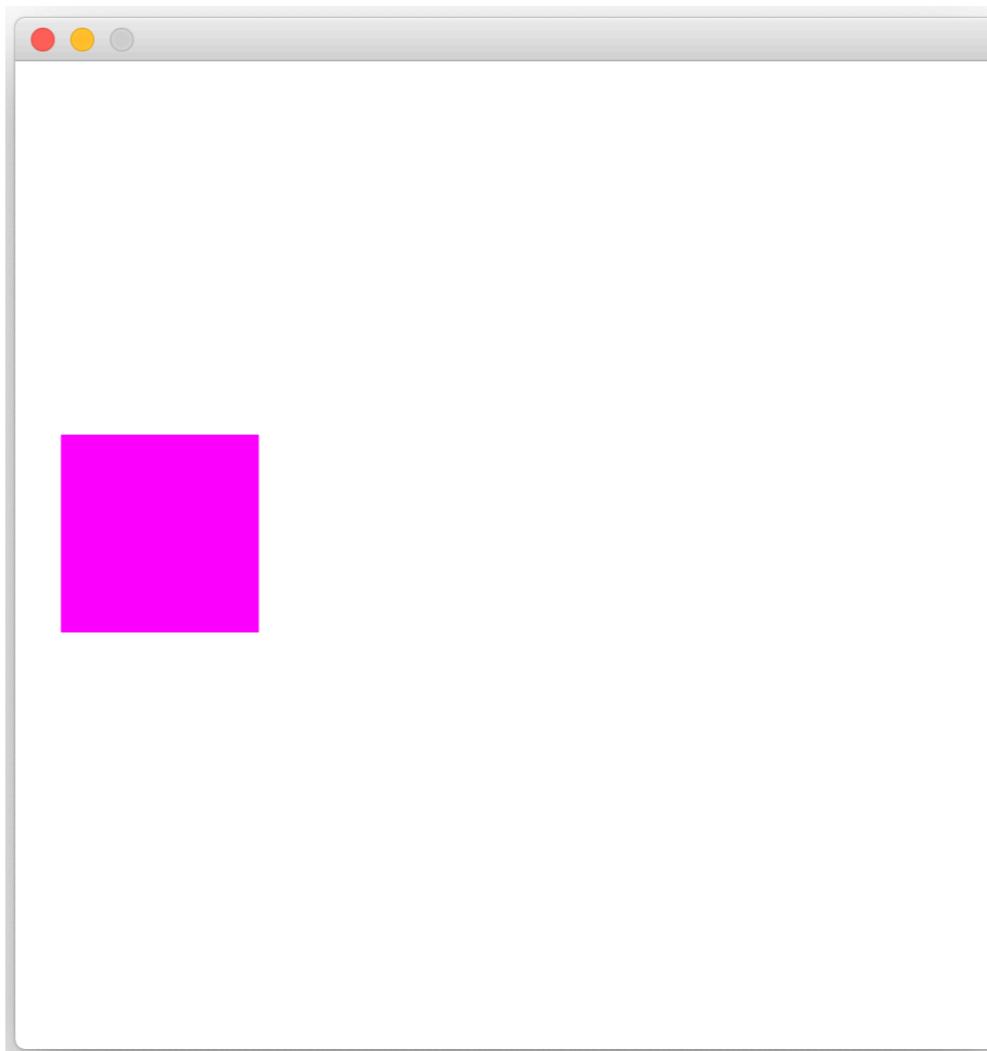
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



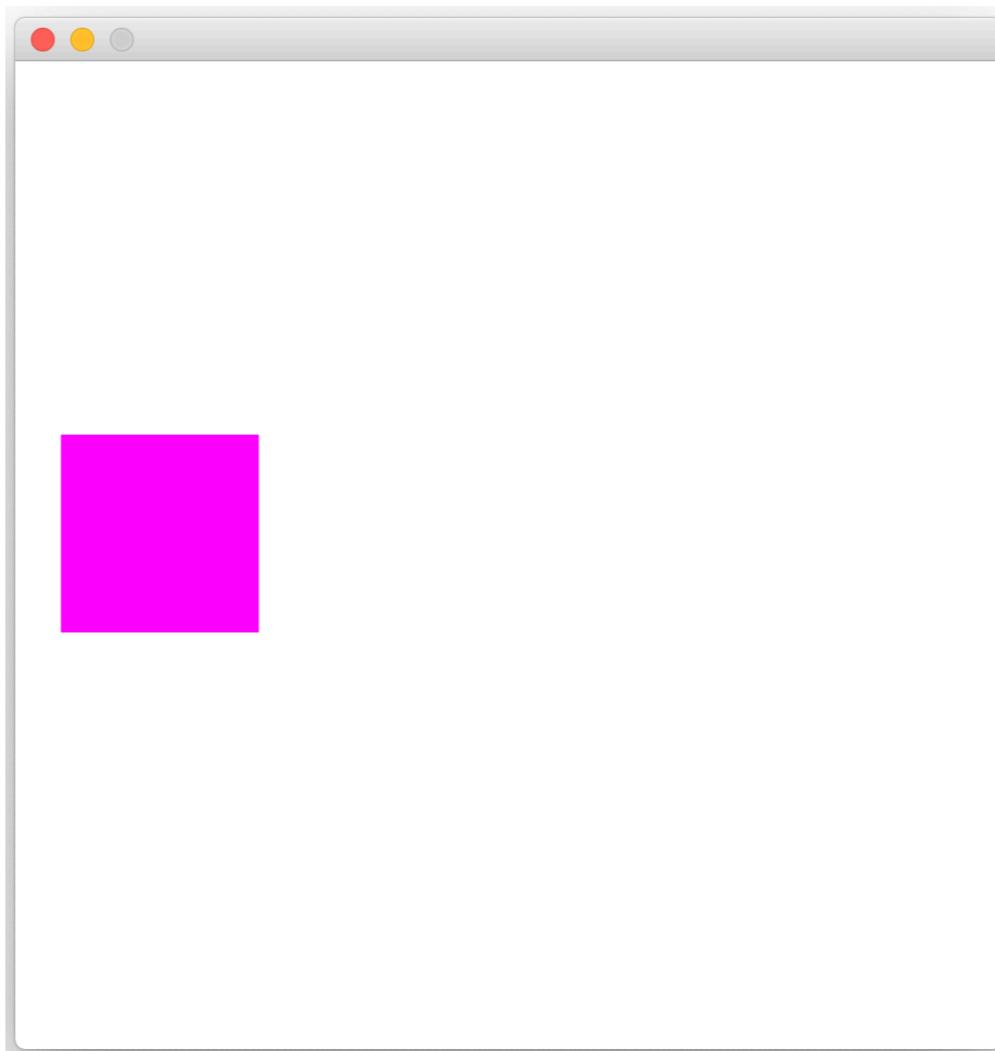
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



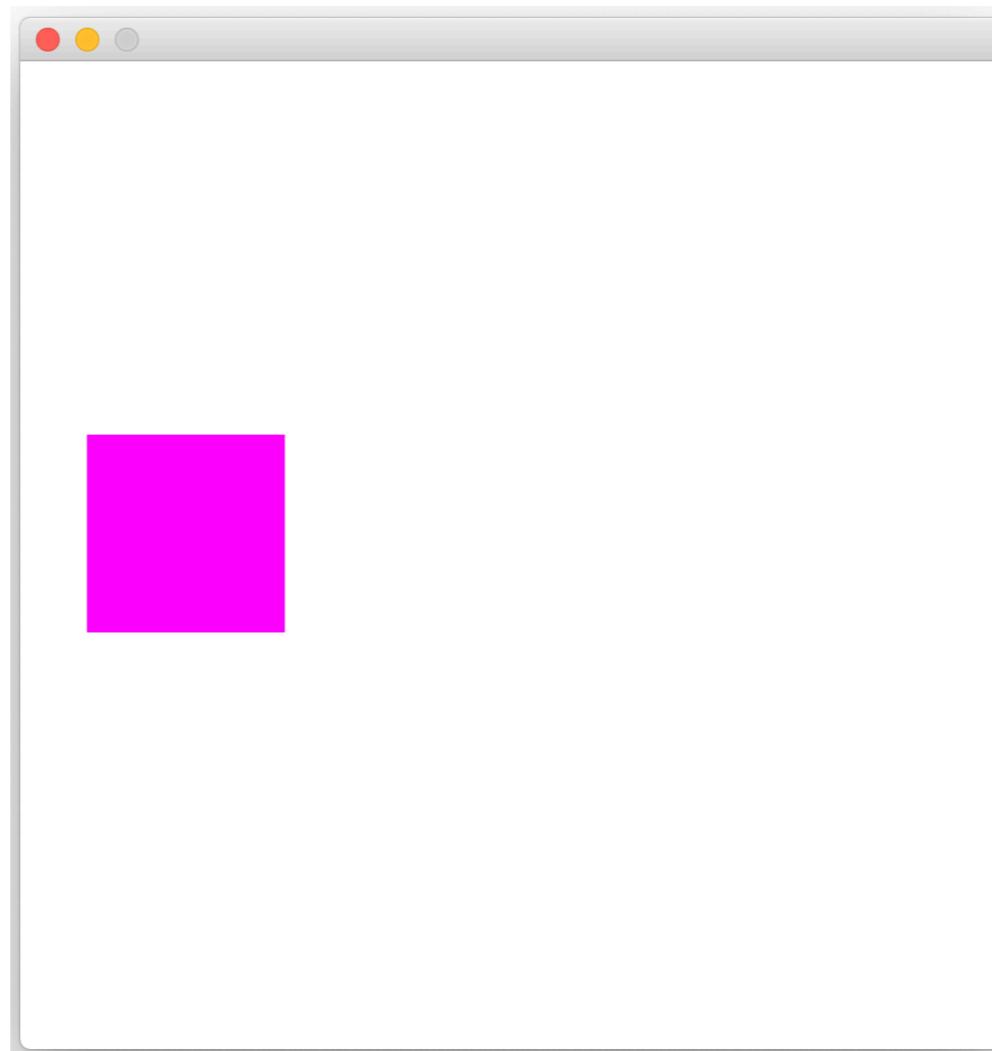
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



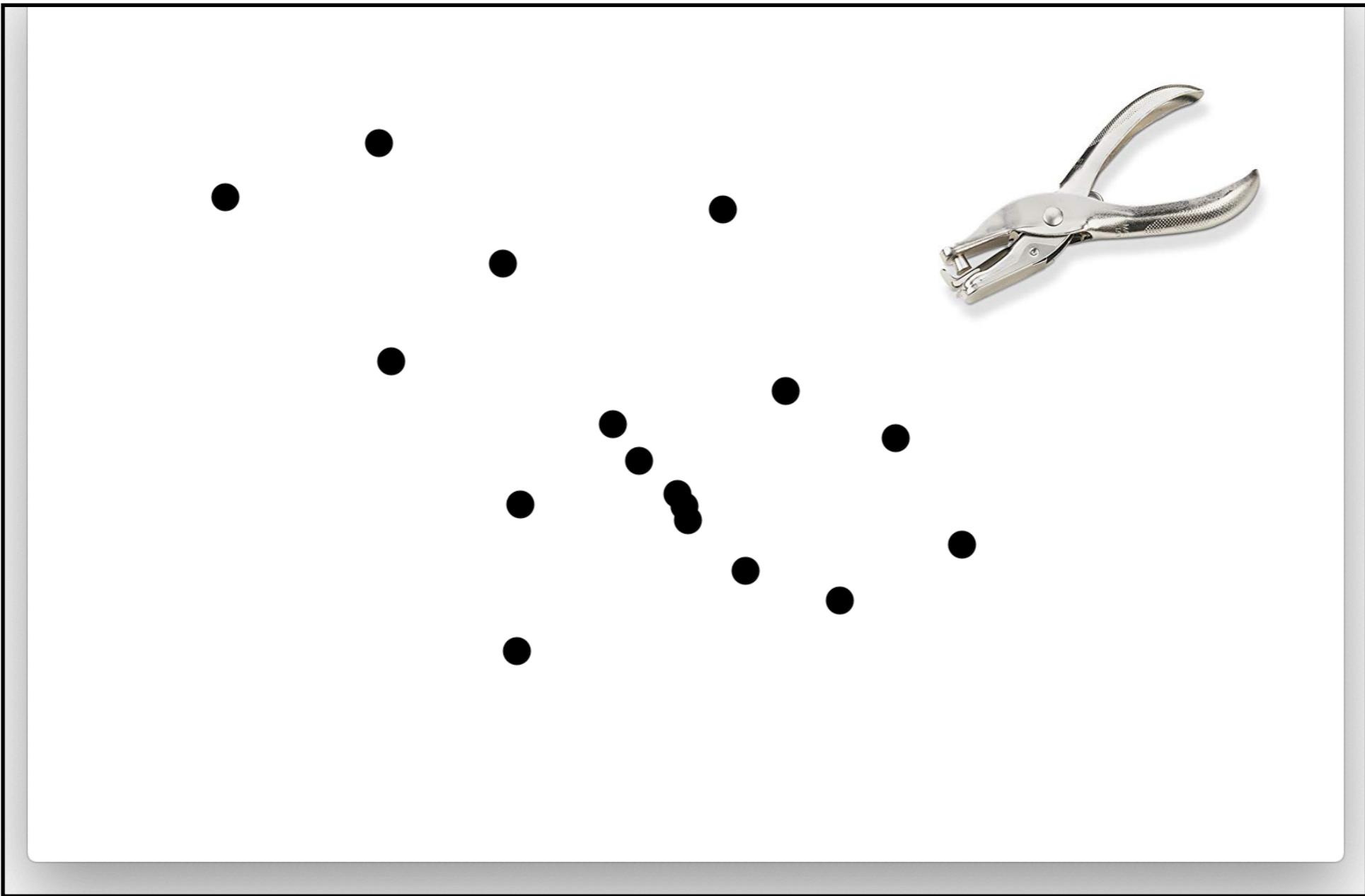
```
def main():
    window = GWindow()
    rect = set_up_rect()
    window.add(rect, (window.width-rect.width)/2, (window.height-rect.height)/2)
    vx = 5
    while True:
        rect.move(vx, 0)
        if rect.x <= 0 or rect.x+rect.width >= window.width:
            vx = -vx
        pause(10)
```



SC101

Week 1

Mouse Event



```
# This constant controls the size of the hole  
SIZE = 30
```

```
# This constant controls the size of the hole  
SIZE = 30
```

```
def main():
```

```
# This constant controls the size of the hole  
SIZE = 30
```

```
def main():  
    onmouseclicked(hole_punch)
```

```
# This constant controls the size of the hole  
SIZE = 30
```

```
def main():  
    onmouseclicked(hole_punch)
```

```
def hole_punch(event):
```

```
# This constant controls the size of the hole  
SIZE = 30
```

```
def main():  
    onmouseclicked(hole_punch)
```

```
def hole_punch(event):  
    hole = G0val(SIZE, SIZE)
```

```
# This constant controls the size of the hole  
SIZE = 30
```

```
def main():  
    onmouseclicked(hole_punch)
```

```
def hole_punch(event):  
    hole = G0val(SIZE, SIZE)  
    hole.filled = True
```

```
# This constant controls the size of the hole
SIZE = 30

def main():
    onmouseclicked(hole_punch)

def hole_punch(event):
    hole = G0val(SIZE, SIZE)
    hole.filled = True
    window.add(hole, event.x, event.y)
```

```
# This constant controls the size of the hole
SIZE = 30

def main():
    onmouseclicked(hole_punch)

def hole_punch(event):
    hole = G0val(SIZE, SIZE)
    hole.filled = True
    window.add(hole, event.x, event.y)
```



有沒有方法讓所有人都看得到一個 variable

```
# This constant controls the size of the hole
SIZE = 30

def main():
    onmouseclicked(hole_punch)

def hole_punch(event):
    hole = G0val(SIZE, SIZE)
    hole.filled = True
    window.add(hole, event.x, event.y)
```

```
# This constant controls the size of the hole
SIZE = 30

window = GWindow()

def main():
    onmouseclicked(hole_punch)

def hole_punch(event):
    hole = GOval(SIZE, SIZE)
    hole.filled = True
    window.add(hole, event.x, event.y)
```

Global Variable

Let's do it!

Asynchronous

Asynchronous

```
def main():  
  
    → onmouseclicked(what_to_do)
```

...

...

```
def what_to_do(event):
```

...

...

Asynchronous

```
def main():  
  
    onmouseclicked(what_to_do)  
  
    ...  
  
    ...  
  
def what_to_do(event):  
  
    ...  
  
    ...
```



Asynchronous

```
def main():  
    onmouseclicked(what_to_do)
```

...
...

```
def what_to_do(event):
```

...
...



Asynchronous

```
def main():  
  
    onmouseclicked(what_to_do)  
  
    ...  
  
    ...  
  
def what_to_do(event):  
  
    ...  
  
    ...
```



Asynchronous

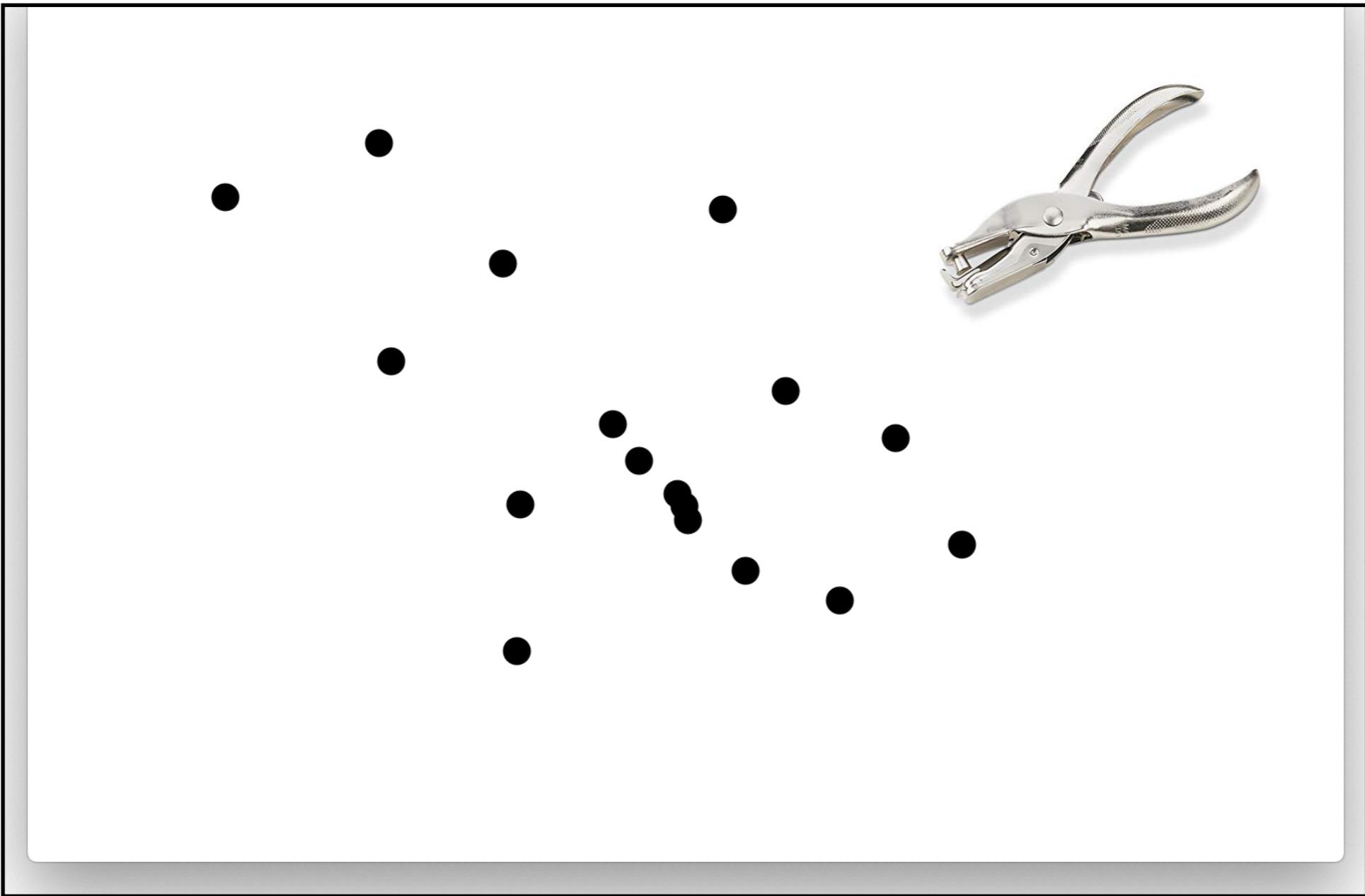
```
def main():  
  
    onmouseclicked(what_to_do)  
  
    ...  
  
    ...  
  
def what_to_do(event):  
  
    ...  
  
    ...
```



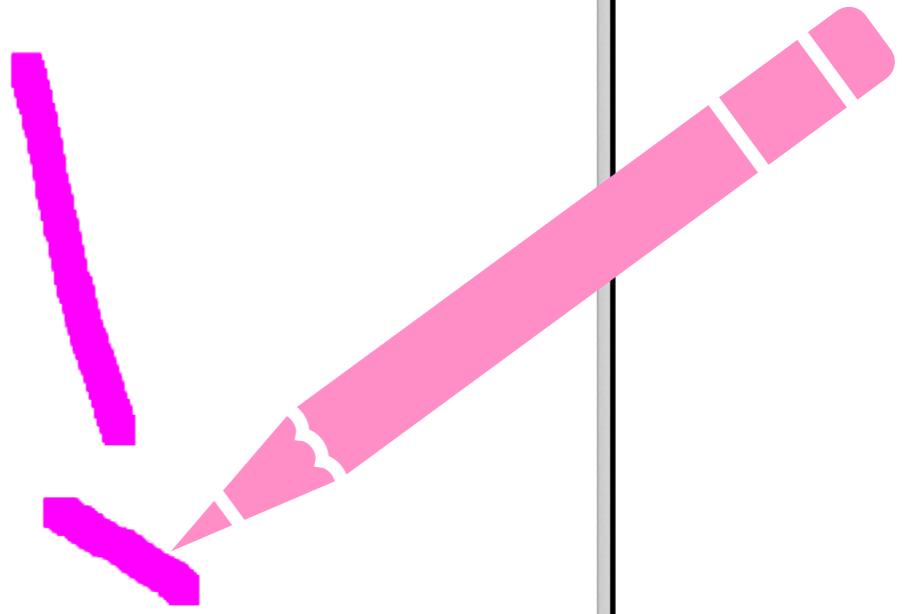
Asynchronous

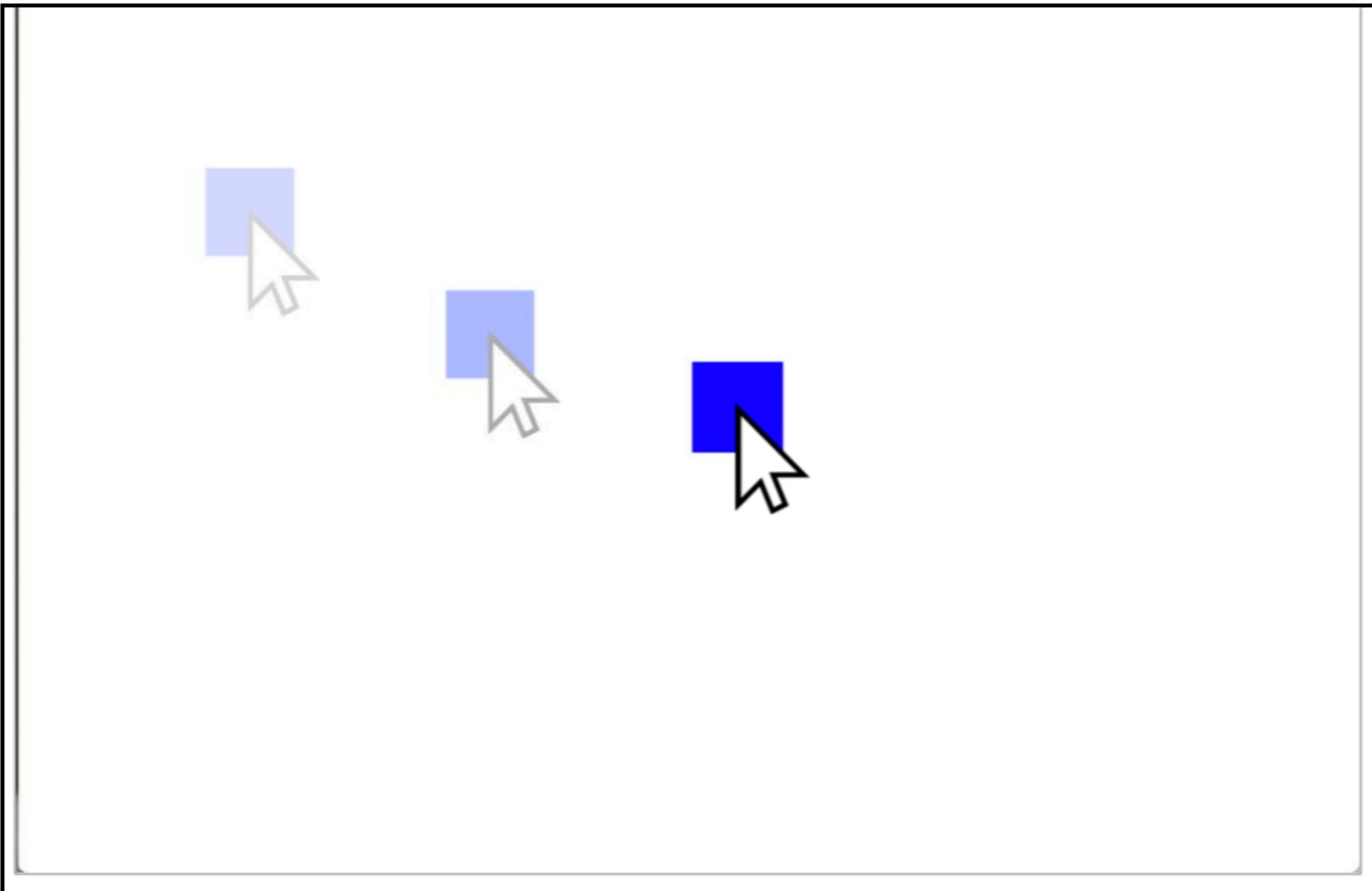
```
def main():  
  
    onmouseclicked(what_to_do)  
  
    ...  
  
    ...  
  
def what_to_do(event):  
  
    ...  
  
    ...
```





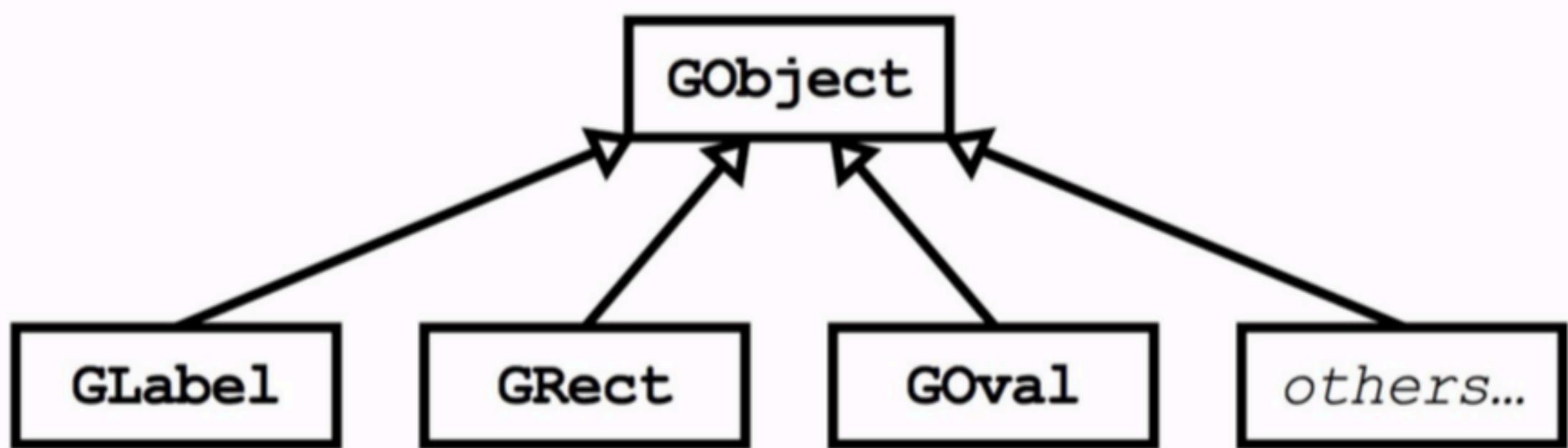
Hello





window.get_object_at(x, y)

告訴使用者 (x, y) 是什麼 object



如果沒東西？

None

None

- 我們可以使用 `is not` 或是 `is` 去看一個 `object` 的狀態

```
maybe_object = window.get_object_at(x, y)
```

If (`maybe_object` is not **None**):

```
    maybe_object.color = 'magenta'
```

```
maybe_object = window.get_object_at(x, y);
```

If (`maybe_object` is not **None**):

```
    window.remove(maybe_object)
```

None



window.remove(maybe_object)

None

- 我們可以使用 `is not` 或是 `is` 去看一個 `object` 的狀態

```
maybe_object = window.get_object_at(x, y)
```

If (`maybe_object` is not **None**):

```
    maybe_object.color = 'magenta'
```

```
maybe_object = window.get_object_at(x, y);
```

If (`maybe_object` is not **None**):

```
    window.remove(maybe_object)
```