Outline

• Importing a library
• Simple Graphics Programming
• Changing the coordinate system
• Common mistakes
Importing a library

There are 3 ways of importing a library/module.

• `>> import math`

• `>> from math import factorial`

• `>> from math import *`
Importing a library

There are 3 ways of importing a library/module.

• >> import math

• >> from math import factorial

• >> from math import *

math.factorial(5) YES
math.pi YES
factorial(5) NO
pi NO
Importing a library

There are 3 ways of importing a library/module.

• >> import math
  - math.factorial(5): YES
  - math.pi: YES
  - factorial(5): NO
  - pi: NO

• >> from math import factorial
  - math.factorial(5): NO
  - math.pi: NO
  - factorial(5): YES
  - pi: NO

• >> from math import *
  - math.factorial(5): NO
  - math.pi: NO
  - factorial(5): YES
  - pi: NO
Importing a library

There are 3 ways of importing a library/module.

• >> import math
• >> from math import factorial
• >> from math import *

<table>
<thead>
<tr>
<th>math.factorial(5)</th>
<th>math.pi</th>
<th>factorial(5)</th>
<th>pi</th>
</tr>
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<td>YES</td>
<td>NO</td>
<td>NO</td>
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<tr>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
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<tr>
<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
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</tbody>
</table>
Simple Graphics Programming

from graphics import *
win = GraphWin("My Window", 200, 400)
win.getMouse()
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win = GraphWin("My Window", 200, 200)

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p3 = Point(150,150)
p4 = Point(200,200)

p1.draw(win)
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p3.draw(win)
p4.draw(win)

win.getMouse()
from graphics import *

def main():
    win = GraphWin("My Window", 500, 500)
    c = Circle(Point(250, 250), 200)
    c.draw(win)
    win.getMouse() # pause for click in window
    win.close()

main()
from graphics import *

def main():
    win = GraphWin("My Window", 500, 500)
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    c.draw(win)
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    win.close()

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    c.draw(win)
    win.getMouse() # pause for click in window
    win.close()

main()
from graphics import *

def main():
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    c = Circle(Point(100, 100), 200)
    c.draw(win)
    win.getMouse()  # pause for click in window
    win.close()

main()
from graphics import *

def main():
    win = GraphWin("My Window", 500, 500)
    c = Circle(Point(100, 100), 100)
    c.draw(win)
    win.getMouse() # pause for click in window
    win.close()

main()
from graphics import *

def main():
    win = GraphWin("My Window", 500, 500)
    c = Circle(Point(100, 100), 100)
    c.draw(win)
    win.getMouse() # pause for click in window
    win.close()

main()
from graphics import *

def main():
    win = GraphWin("My Window", 500, 500)
    c = Circle(Point(100,100), 100)
    c.draw(win)
    win.getMouse() # pause for click in window
    win.close()

main()
from graphics import *

def main():
    win = GraphWin("My Window", 500, 500)
    c = Circle(Point(100, 100), 100)
    c.draw(win)
    win.getMouse()  # pause for click in window
    win.close()

main()
Some graphic functions

- **plot(x, y, color)** Draws the pixel at (x, y) in the window. Color is optional, black is the default.

- **setBackground(color)** Sets the window background to the given color. The initial background is gray.

- **close()** Closes the on-screen window.

- **getMouse()** Pauses for the user to click a mouse in the window and returns where the mouse was clicked as a Point object.
plot(x, y, color)

from graphics import *
win = GraphWin("My Window", 200, 200)
win.plot(100,100, 'red')
win.getMouse()
plot(x, y, color)

from graphics import *
win = GraphWin("My Window", 200, 200)
win.plot(100,100, 'red')
win.getMouse()
from graphics import *

win = GraphWin("My Window", 200, 200)

for i in range(80,120):
    win.plot(i, 100, 'red')

win.getMouse()
plot(x, y, color)

from graphics import *

win = GraphWin("My Window", 200, 200)

for i in range(80,120):
    win.plot(i, 100, 'red')

win.getMouse()
plot(x, y, color)

from graphics import *

win = GraphWin("My Window", 200, 200)

for i in range(80,120):
    win.plot(i, 100, 'red')

win.getMouse()
from graphics import *

win = GraphWin("My Window", 200, 200)

win.setBackground('yellow')

for i in range(80,120):
    win.plot(50, i, 'black')

win.getMouse()
setBackground(color)

from graphics import *

win = GraphWin("My Window", 200, 200)

win.setBackground('yellow')

for i in range(80,120):
    win.plot(50, i, 'black')

win.getMouse()
Some graphic functions (contd.)

Circle methods:

- `Circle(centerPoint, radius)` Constructs a circle with given center point and radius
- `getCenter()` Returns a clone of the center point of the circle
- `getRadius()` Returns the radius of the circle
Some graphic functions (contd.)

**Rectangle Methods:**

- `Rectangle(point1, point2)` Constructs a rectangle having opposite corners at point1 and point2

- `getCenter()` Returns a clone of the center point of the rectangle
from graphics import *

win = GraphWin("My Window", 200, 200)
rect = Rectangle(Point(50,50), Point(150,150))

rect.draw(win)

centerPoint = rect.getCenter()
print(centerPoint.getX())
print(centerPoint.getY())

win.getMouse()
from graphics import *

win = GraphWin("My Window", 200, 200)
rect = Rectangle(Point(50,50), Point(150,150))
rect.draw(win)

centerPoint = rect.getCenter()
print(centerPoint.getX())
print(centerPoint.getY())

win.getMouse()
from graphics import *

win = GraphWin("My Window", 200, 200)
rect = Rectangle(Point(50,50), Point(150,150))
rect.draw(win)

centerPoint = rect.getCenter()
print(centerPoint.getX())
print(centerPoint.getY())

win.getMouse()
from graphics import *

win = GraphWin("My Window", 200, 200)
rect = Rectangle(Point(50,50), Point(150,150))
rect.draw(win)

centerPoint = rect.getCenter()
print(centerPoint.getX())
print(centerPoint.getY())

win.getMouse()
Changing the coordinate system

```python
from graphics import *

win = GraphWin("My Window", 200, 200)

# win.setCoords(0, 0 , 200, 200)

rect = Rectangle(Point(25,25), Point(75,75))
rect.draw(win)

win.getMouse()
```

# setCoords(xll, yll, xur, yur)
# xll: x lower left
# yll: y lower left
# xur: x upper right
# yur: y upper right
Changing the coordinate system

from graphics import *

win = GraphWin("My Window", 200, 200)

# win.setCoords(0, 0, 200, 200)

rect = Rectangle(Point(25,25), Point(75,75))
rect.draw(win)

win.getMouse()
Changing the coordinate system

from graphics import *

win = GraphWin("My Window", 200, 200)

# win.setCoords(0, 0, 200, 200)

rect = Rectangle(Point(25,25), Point(75,75))
rect.draw(win)

win.getMouse()

# setCoords(xll, yll, xur, yur)

# xll: x lower left
# yll: y lower left
# xur: x upper right
# yur: y upper right

Like we are used to
Changing the coordinate system

```python
from graphics import *

win = GraphWin("My Window", 200, 200)
win.setCoords(0, 0 , 200, 200)
rect = Rectangle(Point(25,25), Point(75,75))
rect.draw(win)

win.getMouse()
```

# setCoords(xll, yll, xur, yur)
# xll: x lower left
# yll: y lower left
# xur: x upper right
# yur: y upper right
Changing the coordinate system

from graphics import *

win = GraphWin("My Window", 200, 200)

win.setCoords(0, 0, 200, 200)

rect = Rectangle(Point(25, 25), Point(75, 75))
rect.draw(win)

win.getMouse()
Changing the coordinate system

from graphics import *

win = GraphWin("My Window", 200, 200)
win.setCoords(0, 0, 200, 200)

rect = Rectangle(Point(25,25), Point(75,75))
rect.draw(win)

win.getMouse()

# setCoords(xll, yll, xur, yur)

# xll: x lower left
# yll: y lower left
# xur: x upper right
# yur: y upper right

The position of the rectangle is changed!
Changing the coordinate system

```python
from graphics import *

win = GraphWin("My Window", 200, 200)
# win.setCoords(0, 0 , 200, 200)
rect = Rectangle(Point(25,25), Point(75,75))
rect.draw(win)
win.getMouse()
```

```python
from graphics import *

win = GraphWin("My Window", 200, 200)
win.setCoords(0, 0 , 200, 200)
rect = Rectangle(Point(25,25), Point(75,75))
rect.draw(win)
win.getMouse()
```
Common mistakes

from graphics import *

win = GraphWin("My Window", 200, 200)
rect = Rectangle(Point(50,50), Point(150,150))
Rectangle.draw(win)

win.getMouse()
from graphics import *

win = GraphWin("My Window", 200, 200)
rect = Rectangle(Point(50,50), Point(150,150))

Rectangle.draw(win)  # This line should be removed
rect.draw(win)

win.getMouse()
Common mistakes

from graphics import *

win = GraphWin("My Window", 200, 200)
rect = Rectangle(50,50,150,150)
rect.draw(win)

win.getMouse()
Common mistakes

from graphics import *

win = GraphWin("My Window", 200, 200)
rect = Rectangle(50,50,150,150)
rect.draw(win)

win.getMouse()
Questions?

Thanks