Objectives

• Problem solving using Graphics API

Lab Review

• 2 Challenge problems
  ➢ Multiplication tables
  ➢ Craps
• Examples of different ways to look at and solve problems

Review: Object-Oriented Programming

• How do we create a new object?
• What is the syntax for calling a method on an object?
• What are two types of methods we talked about?
  ➢ How do they work differently?

Review: Object-Oriented Programming

• Objects combine data and methods together
  Provides interface (the methods) that users interact with
  Hides internal data structures, implementation
  Optionally may return something back

Review: Benefits of Object-Oriented Programming

• Abstraction
  ➢ Hides details of underlying implementation
  ➢ Easier to change implementation
• Easy reuse of code
  ➢ We used the graphics.py package
• Collects related data/methods together
  ➢ Easier to reason about data

What Does This Code Do?

• Use OO terminology previously defined

from graphics import *

GraphWin object

win = GraphWin("My Circle", 100, 100)
c = Circle(Point(50,50), 10)
c.draw(win)
win.getMouse()
A GraphWin Object’s Canvas

(0,0) X horizontal axis

Y vertical axis

Coordinates are specified as (x,y)

(200,200)

Problem: Draw a Full-Canvas Tic-Tac-Toe Board

• Using the Graphics API
• Make lines purple and line width 3
  ➢ Keep it general, regardless of GraphWin width, height

Modification to Tic-Tac-Toe

• clone a vertical line and horizontal line and shift appropriately

• Why clone?
  ➢ Maintain the same properties (color, line-width, length)
  ➢ Simplifies code

Getting Input from the User

• `<GraphWinObj>.getMouse()`
  ➢ Returns the user’s mouse click as a `Point` object
• Entry objects
  ➢ Get text from user

Problem

• Create a program where the user tells you where to draw a line
  ➢ What do you need from the user?
  ➢ What do you need to create a line?

Problem: Circle Shift

• Move a circle to the position clicked by the user
  ➢ Repeat five times
Animation

- Use combinations of the method `move` and the function `sleep`
  - Need to `sleep` so that humans can see the graphics moving
  - Computer would process the `moves` too fast!
- `sleep` is part of the `time` module
  - Takes a float representing `seconds` and pauses for that amount of time

Examples of Animation

- From Previous Classes

Problem: Animate Moving to User Click

- In X steps, move from the circle’s current location to the location clicked by user

Reminders

- For Friday
  - Read DARPA Urban Challenge
  - Lab 4

- Extra Credit
  - Applied to labs, which are 38% of grade
  - Read other articles you find, summarize
  - Rainbow Dice implementation