

# Lecture 5: Listeners and assertions

CS 62

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# Inner Classes

- **DrawingCanvas** extends **JPanel**
  - Associates listeners for mouse actions on the canvas
  - Responsible for repainting the screen
- **DrawingMouseListener** and **DrawingMouseMotionListener**
  - Responsible for responding to mouse actions by changing the items in the **ArrayList**.

# Handling Mouse Events

- If you want program to react to mouse press, click, or release on a component
  - send **addMouseListener(mlo)** to component (usually in the constructor of the component)
  - See **PostItApplication.java** and **Demo.java**
  - For motion or drag, send **addMouseMotionListener(mlo)**
- When user presses mouse on a component
  - Computer looks for registered **MouseListener** for component or its containers.
  - If found, sends **mousePressed(evt)** to listener

# Listener

- Object designated as mouse listener must
  - implement **MouseListener** (& implement **mousePressed**, **mouseReleased**, & **mouseClicked**) *or*
  - extend **MouseAdapter** (which has default implementations of all 3)
- Second is easier unless class already extends another.
  - *Can only extend one class in Java*
- Similarly, for mouse motion listener
  - implement **MouseMotionListener** *or*
  - extend **MouseMotionAdapter**

# Listeners in PostItApplication

- Main class (**this**) is listener for button and choice. Set up when GUI items constructed
- Special listener objects for mouse actions. Set up by **DrawingCanvas** since listening for actions on that object.

# Pre and Post conditions

- Pre-condition: Specification of what must be true for method to work properly
- Post-condition: Specification of what must be true at end of method if precondition held before execution.
- See `Ratio` class example

# Assertions in Java

- Won't use **Assert** class from Bailey.
- Command to check assertions in standard Java
- Two forms:
  - `assert boolExp`
  - `assert boolExp: message`
- Article on when to use assert:  
<https://docs.oracle.com/javase/8/docs/technotes/guides/language/assert.html>

# Assertions help...

- Defensive programming
- Little cost to executing assertions ... and can turn off checking
- Extremely useful in debugging in tracking down what is going wrong - can be better than inserting `println`'s.
- Also useful in checking cases that should not occur
  - e.g., defaults in `switch`, other control paths not taken.
- Do NOT use argument checking in public methods
  - Should throw an exception instead
- Do NOT use to perform action that is critical for the program
  - Instead perform the action before the assertion and then assert that the action succeeded



# Turning on assert

- Turn on assertions when run program, by adding **-ea** as virtual machine argument in arguments tab in Eclipse when set up runtime configuration.
- If you leave it off, then it ignores assert statements.
- If on and the assertion is false, then it will raise an **AssertionError** exception and will print associated message
- They should not be caught as represents a program error