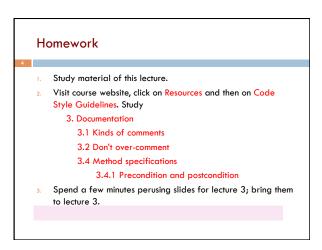
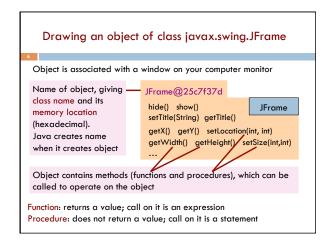


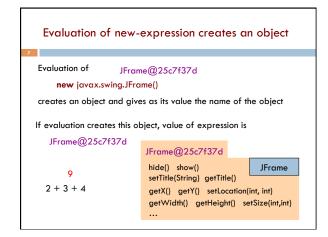
## CMS available. Visit course webpage: www.cs.cornell.edu/courses/CS2110/ Click "Links", then "CMS for 2110". Not enrolled? Ask Megan mlg34@cs.cornell.edu to enroll you (needs your netid) Look at videoNote.com/cornell to see a previous lecture. Our lectures are being recorded. Please download ppt slides the evening before each lecture, have them available in class. Please don't ask questions on the piazza about that material the day before the lecture! Download DrJava? download the jar file, not the app. See Piazza note @15.

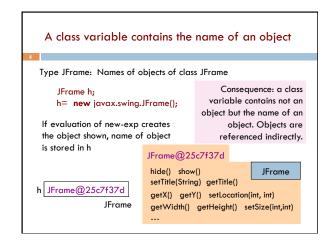
## Python and Matlab have objects and classes. Strong-typing nature of Java changes how OO is done and how useful it is. Put aside your previous experience with OO (if any). This lecture: First: describe objects, demoing their creation and use. Second: Show you a class definition and how it contains definitions of functions and procedures that appear in each object of the class. Third: Talk about keyword null. Fourth (if there is time). Show you a Java application, a class with a "static" procedure with a certain parameter.

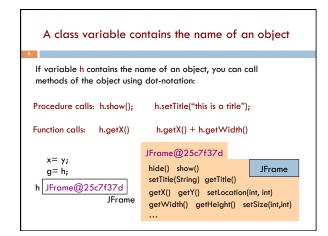


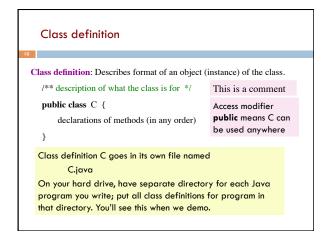
## Java OO References to course text and JavaSummary.pptx Objects: B.1 slide 10-16 Text mentions fields of Calling methods: B.2-B.3 slide 18 an object. We cover these in next lecture Class definition: B.5 slide 11 public, private: B.5 slide 11, 12 Indirect reference, aliasing: B.6 slide 17 Method declarations: B.7 Text uses value-producing Parameter vs argument: B.12-B.14 method for function and slide 14 void method for procedure. Methods may have parameters Get used to terminology: Method calls may have arguments function and procedure











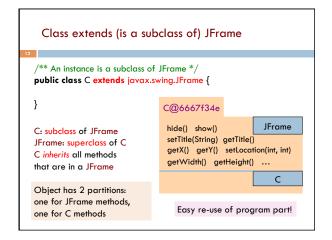
```
First class definition

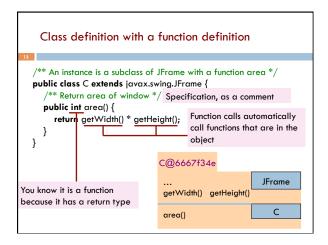
/** An instance (object of the class) has (almost) no methods */
public class C {

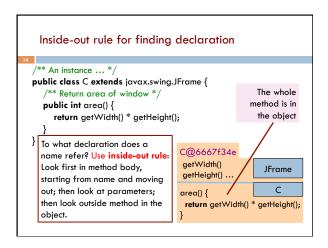
}

Then, execution of

C k;
k = new C();
creates object shown to right
and stores its name in k
```







```
Inside-out rule for finding declaration
/** An instance ... */
public class C extends ...JFrame {
                                       Function area: in each object.
   ** Return area of window */
                                       getWidth() calls function
  public int area() {
                                       getWidth in the object in
   return getWidth() * getHeight();
                                       which it appears.
}
                                     C@6667f34e
   C@2abcde14
    getWidth()
                                      getWidth()
                        JFrame
                                                          JFrame
    getHeight()
                                      getHeight()
   area() {
                                     area() {
    return getWidth() * getHeight();
                                      return getWidth() * getHeight();
```

```
Class definition with a procedure definition
/** An instance is a JFrame with more methods */
public class C extends javax.swing.JFrame {
  public int area() {
     return getWidth() * getHeight();
                                         C@6667f34e
  /** Set width of window to its height *
  public void setWtoH() {
                                                         JFrame
     setSize(getHeight(), getHeight());
                                          setSize(int, int)
                                          getWidth() getHeight()
Call on
                It is a procedure
                                          area()
                because it has void
                                                              C
 procedure
                                          setWtoH()
                instead of return type
  setSize
```

```
Using an object of class Date
/** An instance is a JFrame with more methods */
public class C extends javax.swing.JFrame {
  /^{**} Put the date and time in the title ^*/
  public void setTitleToDate() {
      setTitle((new java.util.Date()).toString());
                                               C@6667f34e
}
                                                            JFrame
    An object of class java.util.Date
                                            setSize(int, int)
    contains the date and time at
                                            setTitle(String)
    which it was created.
    It has a function to String(), which
                                            area() {
                                                              С
    yields the data as a String.
                                            setWtoH() setTitleToDate
```

```
About null

v1 C@16

v2 null

null denotes the absence of a name.

v2.getName() is a mistake! Program stops with a NullPointerException

You can write assignments like: v!= null;

and expressions like: v1 == null
```

```
/** A simple program that prints Hello, world! */
public class myClass {

    /** Called to start program. */
    public static void main(String[] args) {
        System.out.println("Hello, world!");
    }
}

We explain static next week.
Briefly: there is only one copy of procedure main, and it is not in any object
```