User Input and "Scanner" class

- Our programs so far have dealt with predetermined input data

- However, most programs needs some kind of user input

- The Scanner class: Allows us to read from a stream of text input, such as the keyboard

- To use it, first you must add this line to your .java file, above the class declaration:

```
import java.util.Scanner;
```

User Input and "Scanner" class

- Next, within your program, you will need to create the Scanner object:

  ```
  Scanner scan = new Scanner(System.in);
  ```

- Once created, the Scanner object can be used to invoke various input methods, such as:

  ```
  String answer = scan.nextLine();
  ```

- To use the Scanner object, you need to be aware of the different methods and how they work, as well as how input works

How keyboard input works

- The data will enter as a "stream", held in a buffer

- Made of "tokens", divided by spaces, and "lines", divided by newline characters

- User types...

```
12 24.7 hello, goodbye, hey[Enter]
This is a line true 78 45.6[Enter]
```

- Buffer contains...

12	24.7	hello,	goodbye,	hey	'\n'	This
is	a	line	true	78	45.6	'\n'

Various "Scanner" methods

Method	Returns	Takes
scan.next()	String	next token in the buffer
scan.nextLine()	String	everything up to the newline character
scan.nextInt()	int	token that represents an integer
scan.nextDouble()	double	token that represents a numeric value
scan.nextBoolean()	boolean	"true" or "false"

"Math" and "Random" classes

- The **Math** class is like String (does not require import)

- It is a holder for various methods performing mathematical functions, as well as the mathematical constants **pi** and **e**:

  `Math.PI` and `Math.E`

- These methods are invoked using the class name, rather than creating an object

Various "Math" methods

Method	Returns	Takes
Math.abs(...) absolute value	type given	int, long, float, double
Math.sin(...) **Math.cos(...)** **Math.tan(...)** sin/cos/tan of an angle	double	double (angle in radians)
Math.pow(..., …) raises 1st to the power of 2nd	double	two double
Math.random() value between 0.0 to 0.9999...	double	nothing
Math.min(..., ...) **Math.max(..., …)** min/max of two values	type given	two of: int, long, float, double

"Math" and "Random" classes

- The ***Random*** class does require an import

```
import java.util.Random;
```

- It exists for the purpose of generating random values of various types and within ranges

- To use the Random class, you do in fact have to create an object:

```
Random random = new Random();
```

Various "Random" methods

Method	Returns	Takes
random.nextInt() Gives you a random int value	int	nothing
random.nextDouble() Gives you a random int value	double	nothing
random.nextInt(...) Gives you a random int value between 0 and the specified (minus 1)	int	int
random.nextBoolean() Gives you a random true/false value	boolean	nothing