

Lecture 21

Java – Arithmetic Operators

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| Mathematical Operators and Routines

- Operators are symbols that represent simple computations.
 - Addition operator is +,
 - Subtraction is -,
 - Multiplication is *, and
 - Division is / - Integer Division
- The following program converts a time of day to minutes:

```
int hour = 2;  
int minute = 5;  
System.out.printf("Total minutes = %d",hour*60+minute);
```

| Mathematical Operators and Routines

- Division is / - Integer Division
- In Java, the **default floating-point** type is called **double**, which is **short for double-precision**

```
2 public class seko {  
3     public static void main(String[] args)  
4  
5     {  
6         int minute =59;  
7         System.out.println(minute/60);  
8     }  
9 }
```

```
2 public class seko {  
3     public static void main(String[] args)  
4  
5     {  
6         double minute =59;  
7         System.out.println(minute/60);  
8     }  
9 }
```

| Mathematical Operators and Routines

- Very simplest routines use built-in operators
 - `+`, `-`, `*`, `/`, `^`, `%`
 - Be careful with `/` on int and long variables
- Static methods in the `Math` class
 - So you call `Math.cos(...)`, `Math.random()`, etc.
 - Most operate on double precision floating point numbers
 - Simple operations: `Math.pow()`, etc.
 - `pow` (x^y), `sqrt` ($\sqrt{x}$), `log` ($\log e$), `log10`

| Mathematical Operators and Routines

- Trig functions: `Math.sin()`, etc.
 - `sin`, `cos`, `tan`, `asin`, `acos`, `atan`
 - Args are in radians, not degrees, (see `toDegrees` and `toRadians`)
- Rounding and comparison: `Math.round()`, etc.
 - `round`, `floor`, `ceiling`, `abs`, `min`, `max`
 - Random numbers: `Math.random()`
- `random (Math.random() )`
 - returns from 0 inclusive to 1 exclusive).
 - See **Random** class for more control over randomization.

| References

- Java: How to Program, 9th Edition (Deitel) 9th Edition by Paul Deitel , Harvey M. Deitel
- Head First Java, 2nd Edition 2nd Edition by Kathy Sierra, Bert Bates
- Think Java: How to Think Like a Computer Scientist 1st Edition by Allen B. Downey, Chris Mayfield