Topic 13
More Conditional Execution

"Great dancers are not great because of their technique; they are great because of their passion."

-Martha Graham

Based on slides for Building Java Programs by Reges/Stepp, found at http://faculty.washington.edu/stepp/book/

Logical operators && || !

- Boolean expressions can be joined together with the following *logical operators*:

Operator	Description	Example	Result
&&	and	(9 != 6) && (2 < 3)	true
||	or	(2 == 3) || (-1 < 5)	true
!	not	!(7 > 0)	false

- The following 'truth tables' show the effect of each operator on any boolean values p and q:

p	q	p && q	p || q
true	true	true	true
true	false	false	true
false	true	false	true
false	false	false	false

p	!p
true	false
false	true

Using Logical Operators

```
if( 5 <= x <= 10 ) // syntax error

if( 5 <= x && x <= 10 ) //okay

if( 5 <= x || x <= 10 )
// okay, but ...
```

Evaluating Tests

What is the result of each of the following expressions?

```
int x = 42;
int y = 17;
int z = 25;
```

- `y < x && y <= z`
- `x % 2 == y % 2 || x % 2 == z % 2`
- `x <= y + z && x >= y + z`
- `!(x < y && x < z)`
- `(x + y) % 2 == 0 || !((z - y) % 2 == 0)`

More Practice

- Write a method to count the number of factors in a positive integer
  6 -> 1, 2, 3
  12 -> 1, 2, 3, 4, 6, 12
- Write a method to determine if a given number is prime, divisible only by itself and 1
- Write a program to determine if two numbers are relatively prime, they don't share any factors other than 1.

More Practice

- Write a program that reads two numbers from the user and tells whether they are relatively prime (have no common factors other than 1).
  - Examples:

```
Type two numbers: 9 16
9 and 16 are relatively prime
```

(run #2)

```
Type two numbers: 7 21
7 and 21 are not relatively prime
7 is a factor of 7 and 21
```