Conditions and if/else

Conditions

score > 90

- Evaluates to true (1) or false (0)
- Generally …

   variable operator variable

   variable operator constant

Comparison Operators

- <

- >

- <=

- >=

- ==
  - NOT the same as =

- !=

Examples

- x=5　　y=8　　z=5　　MAX=10　　initial='s'

```
x<y
y>MAX
x<=z
z>=MAX
initial=='r'
x!=z
```

Logical Operators

- &&
- ||
- !

- x=5   y=8   z=5   MAX=10   initial='s'

x<y && z>MAX

x<y || z>MAX

!(x>y)

Precedence

- (), [], .
- ++ --
- * / %
- + -
- < <= >= >
- == !=
- &&
- ||
- =

Short-Circuit Evaluation

- Stop evaluation when true/false value is determined

- x=6   y=9

```
x>2 || y > 13
x<2 && y>13
var != null && var.getData() == 10
```

Logical Assignment and Negation

```
in_range = (x>0 && x<=10) # 1 if x between 1-10, 0 otherwise


same_initials = (first_initial=='S'&& last_initial=='R')

not_same_initials = not(first_initial=='S'&& last_initial=='R')
not_same_initials = (first_initial!='S' || last_initial!='R')
```

DeMorgan's Theorem

- !(a && b) => (!(a) || !(b))

- !(a || b) => (!(a) && !(b))

if Statement

- Condition must be surrounded by ()
- Statements must be surrounded by {}
- Each statement must end with ;

```
if (condition) {
    statements
}
if (age >= 16) {
    System.out.println("You can get a driver's license.");
}
if (age > 21) {
    System.out.println("You can purchase alcohol.");
    System.out.println("You can gamble.");
}

if(age >= 16 && age < 21) {
    System.out.println("You can drive but you cannot gamble.");
}
```

if/else Statement

```
if(condition) {
    statements
} else {
    statements
}
if(grade > 60) {
    System.out.println("You passed the class.");
    System.out.println("Next up, CS112.");
} else {
    System.out.println("Sorry, you did not pass.");
    System.out.println("Try again next semester.");
}
```

Nested if Statements

```
if (condition) {
   if(condition) {
        statement
   } else {
        statement
   }
} else {
   statement
}

if(grade > 60) {
        System.out.println("You passed the class.");
        if(grade > 90) {
                System.out.println("You passed with an A!");
        }
} else {
        System.out.println("Sorry, you did not pass.");
}
```

Chained Conditionals

```java
if(num > 0 && num <= 10) {
    System.out.println("Your number is between 1 and 10");
} else if(num > 10) {
    System.out.println("Your number is too high");
} else {
    System.out.println("Your number is too low");
}
```

Using Functions

```
String getGrade(double score) {
    if(score > 90) {
        return "A";
    } else if(score > 80) {
        return "B";
    } else if(score > 70) {
        return "C";
    } else if(score > 60) {
        return "D";
    } else {
        return "F";
    }
}
```

Exercises

1. Write a method that takes as input three integers representing a month, day, and year, converts the integer representation of the month to a string, and prints the date in the format *Month_String Day, Year*

   - Example: March 17, 2004