

## UNIT 3: Boolean Expressions + if Statements

### Recap

↳ Boolean - Data type that evaluates to true or false

★ Boolean Expression - Evaluates to whether something is true or false

is  $2.2 = 2.2?$  → yes (true)

is "Hi" = "Hello"? → no (false)

### Relational Operators

$==$	$!=$	$>$	$>=$	$<$	$<=$
↙ ↘	↙ ↘	↙ ↘	↙ ↘	↙ ↘	↙ ↘
equal to	not equal to	greater than	greater than or equal	less than	less than or equal

Ex)  $(2.0 == (4.0 - 2.0)) \rightarrow \underline{\underline{\text{true}}}$   
 $\underline{2.0} == \underline{2.0}$

int a = 7 % 2;  $\begin{array}{r} 2 \overline{) 7} \\ \underline{4} \phantom{0} \\ 3 \end{array} \rightarrow 1$

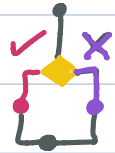
$(a > 2); \rightarrow \underline{\underline{\text{false}}}$

$1 > 2$

★ Control Flow - We can disrupt our "flow" by running portions of code only when we want to  
 ↳ when something is true

if Statement - Runs code if something is true.

```
if (boolean expression) {
    // code to run
}
else if (another expression) {
```



ex)

```
boolean isRaining = true;
if (isRaining == true) {
    System.out.println("Bring umbrella!");
}
```

//code

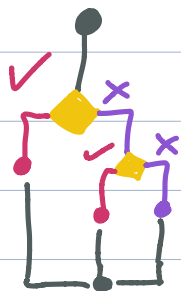
```
}
else {
    // code to run
}
```

← only runs when the code in the previous if statement isn't run!

else {

```
System.out.println("It isn't raining!");
}
```

}



```
if (expression) {
```

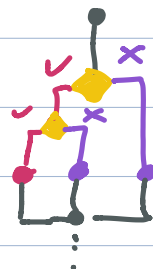
```
if (2nd exp) {
```

```
//code
```

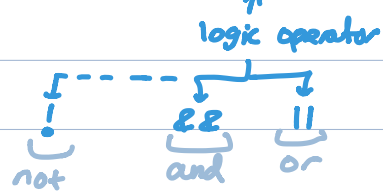
```
} else { }
```

```
}
```

```
else { //stuff }
```



if (condition1   condition2) { ... }



if !(A) { ... }

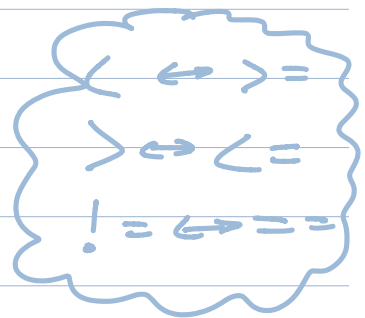
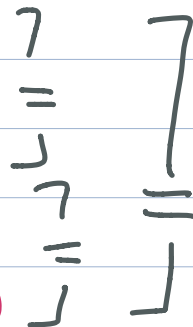
### De Morgan's Laws

$$\neg(A \wedge B) \rightarrow \neg A \vee \neg B$$

$$\neg(A < 1 \wedge B > 2)$$

$$\neg(A < 1) \vee \neg(B > 2)$$

$$(A \geq 1) \vee (B \leq 2)$$



### Short-Circuit Evaluation

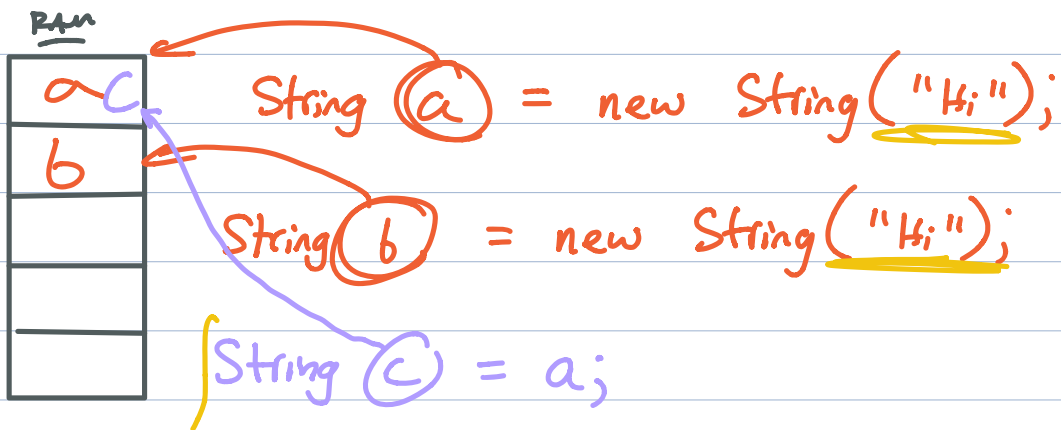
false

$$(A \wedge \text{~~B~~)}$$

$$(A \vee \text{~~B~~)} \rightarrow \text{true}$$

True

## Comparing Objects



$(a == b) \Rightarrow \text{false}$   
 $(a == c) \Rightarrow \text{true}$

## NOTE :

`if (expression)`  
`→ System.out.println("Hi");`  
`→ System.out.println("world!");`