

# Logical Operators

<b>Operator</b>	<b>Name</b>	<b>Description</b>
<b>!</b>	not	logical negation
<b>&amp;&amp;</b>	and	logical conjunction
<b>  </b>	or	logical disjunction
<b>^</b>	exclusive or	logical exclusion

# Truth Table for Operator !

<b>p</b>	<b>!p</b>	<b>Example (assume age = 24, weight = 140)</b>
<b>true</b>	false	!(age > 18) is false, because (age > 18) is true.
<b>false</b>	true	!(weight == 150) is true, because (weight == 150) is false.

# Truth Table for Operator &&

$p_1$	$p_2$	$p_1 \ \&\& \ p_2$	Example (assume age = 24, weight = 140)
<b>false</b>	false	false	(age $\leq$ 18) $\&\&$ (weight $<$ 140) is false, because both conditions are both false.
<b>false</b>	true	false	-
<b>true</b>	false	false	(age $>$ 18) $\&\&$ (weight $>$ 140) is false, because (weight $>$ 140) is false.
<b>true</b>	true	true	(age $>$ 18) $\&\&$ (weight $\geq$ 140) is true, because both (age $>$ 18) and (weight $\geq$ 140) are true.

# Truth Table for Operator ||

$p_1$	$p_2$	$p_1 \parallel p_2$	Example (assume age = 24, weight = 140)
<b>false</b>	false	false	-
<b>false</b>	true	true	(age > 34)    (weight <= 140) is true, because (age > 34) is false, but (weight <= 140) is true.
<b>true</b>	false	true	(age > 14)    (weight >= 150) is false, because (age > 14) is true.
<b>true</b>	true	true	-

# Truth Table for Operator $\wedge$

$p_1$	$p_2$	$p_1 \wedge p_2$	Example (assume age = 24, weight = 140)
<b>false</b>	false	false	$(\text{age} > 34) \wedge (\text{weight} > 140)$ is true, because $(\text{age} > 34)$ is false and $(\text{weight} > 140)$ is false.
<b>false</b>	true	true	$(\text{age} > 34) \wedge (\text{weight} \geq 140)$ is true, because $(\text{age} > 34)$ is false but $(\text{weight} \geq 140)$ is true.
<b>true</b>	false	true	$(\text{age} > 14) \wedge (\text{weight} > 140)$ is true, because $(\text{age} > 14)$ is true and $(\text{weight} > 140)$ is false.
<b>true</b>	true	false	-

```
if(x >= 10 && x <= 100) {
    System.out.println("x is between 10 and 100 (inclusive).");
}

if(y < 10 || y > 100 ) {
    System.out.println("y is not between 10 and 100 (inclusive).");
}

if( !(y >= 10 && y <= 100) ) {
    System.out.println("y is not between 10 and 100 (inclusive).");
}

if((x >= 10 && x <= 100) || (y >= 10 && y <= 100 )){
    System.out.println("Either x or y (or both) are between 10 and 100 (inclusive).");
}
```

1. Ask the user for a four digit number.
2. Read an integer from the user.
3. If the number is negative, make it positive.
4. If the number is four digits long, sum the digits.
  - 4a. Use % to get the rightmost digit.
  - 4b. Use / to get rid of the rightmost digit.
5. If not, output an error message.