- Paz now posted
- Lab 2 extended 1 day
- Recommended work:
  read 7 do exercises for chapter 2
  p. 40-44 of text.

Chapter 3: Statements & Control flow

3 categories of statements:

1. Sequential
2. Conditional (branching)
3. Iterative (lopping)
## Relational Op

<table>
<thead>
<tr>
<th>Relation</th>
<th>Symbol</th>
<th>Example 1</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>less than</td>
<td>&lt;</td>
<td>≤&lt;10</td>
<td>True</td>
</tr>
<tr>
<td>less than or</td>
<td>&lt;=</td>
<td>≤&lt;10</td>
<td>True</td>
</tr>
<tr>
<td>equal to</td>
<td>&gt;</td>
<td>≤&gt;10</td>
<td>False</td>
</tr>
<tr>
<td>greater than</td>
<td>&gt;=</td>
<td>≤&gt;=10</td>
<td>False</td>
</tr>
<tr>
<td>not equal to</td>
<td>!=</td>
<td>≤!1=10</td>
<td>True</td>
</tr>
</tbody>
</table>

## Logical Op

<table>
<thead>
<tr>
<th>Operation</th>
<th>Symbol</th>
<th>Example 1</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>and</td>
<td>&amp; &amp;</td>
<td>(≤2) &amp; (≤3 ≤4)</td>
<td>True</td>
</tr>
<tr>
<td>or</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>not</td>
<td>![</td>
<td>![≤2]</td>
<td>False</td>
</tr>
</tbody>
</table>
Truth tables:

Let $A, B$ be boolean variables.

<table>
<thead>
<tr>
<th>$A$</th>
<th>$B$</th>
<th>$A &amp; &amp; B$</th>
<th>\text{(Conjunction)}</th>
</tr>
</thead>
<tbody>
<tr>
<td>$F$</td>
<td>$F$</td>
<td>$F$</td>
<td></td>
</tr>
<tr>
<td>$F$</td>
<td>$T$</td>
<td>$F$</td>
<td></td>
</tr>
<tr>
<td>$T$</td>
<td>$F$</td>
<td>$F$</td>
<td></td>
</tr>
<tr>
<td>$T$</td>
<td>$T$</td>
<td>$T$</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$A$</th>
<th>$B$</th>
<th>$A \mid\mid B$</th>
<th>\text{(Disjunction)}</th>
</tr>
</thead>
<tbody>
<tr>
<td>$F$</td>
<td>$F$</td>
<td>$F$</td>
<td></td>
</tr>
<tr>
<td>$F$</td>
<td>$T$</td>
<td>$T$</td>
<td></td>
</tr>
<tr>
<td>$T$</td>
<td>$F$</td>
<td>$T$</td>
<td></td>
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<tr>
<td>$T$</td>
<td>$T$</td>
<td>$T$</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$A$</th>
<th>$\neg A$</th>
<th>\text{(Negation)}</th>
</tr>
</thead>
<tbody>
<tr>
<td>$F$</td>
<td>$T$</td>
<td></td>
</tr>
<tr>
<td>$T$</td>
<td>$F$</td>
<td></td>
</tr>
</tbody>
</table>
exclusi\(v^e\)e or: xor

\[\begin{array}{c|c|c|c}
A & B & A \text{ xor } B \\
\hline
F & F & F \\
T & F & T \\
T & F & T \\
T & T & F \\
\end{array}\]

xor can be implemented in Java in several ways:

- \((\neg A \& \neg B) \lor (A \& B)\)
- \(A \neq B\)
Conditional Docs:

- if
- if-else
- switch

```
if (condition) {
    stmt;
    stmt;
    ...
}

? stmt;
```
Note: if true branch has just one stmt, then L...? are optional.

if (cond) or if (cond) {
    stmt;
    stmt;
    ...
}

Note: a list of statements in {...} is called a block.
Note: as before. If either branch has just one stmt, then the branches are optional.
Common errors:

Ex. 1) (cond) 
   stnt; 
   stnt; this stnt is unconditional

Ex. Syntax error:

   if (cond) 
     stnt;
     stnt;
   else
     stnt;
If either branch is short:

```
if (cond) stmt;
else stmt;
```

- if they're really short:

```
if (cond) stmt; else stmt;
```

Ex. Sort3.java

\[
\begin{array}{ccc}
x & y & z \\
3 & 2 & + \\
2 & 3 & 3 \\
1 & 2 & \end{array}
\]
Ex. Sort4.java

```
a b c d
- - - -
+ 3  2  +
3 4 4
2 + 4
≠ 3 3 4
\n[1 2 3 4]
```

**Exercise:**
Write Sort5.java (either into a doubles.)
more on formatting:

```python
if (cond 1):
    if (cond 2):
        stmt1;
    else:
        stmt2;
stmt3;
```

Rule: `else` always goes with most recent `if`.
another common construction

```
if (cond 1)
  stmt 1;
else
  if (cond 2)
    stmt 2;
  else
    if (cond 3)
      stmt 3;
    else
      stmt 4;
```