Chapter 3 - Selections
Example:

```java
if (radius < 0)
    System.out.println("bad input - negative radius");
else {
    area = PI * radius * radius;
    System.out.println("Area = " + area);
}
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General forms:

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if ( <condition> ) <statement>
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```java
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The Compound Statement:

```java
{ <statement> ... <statement> }
```
Conditions:

- Relational operators: <, >, <=, >=, ==, !=

  - Example: "n lies in the interval 1...10"
    \[ n \geq 1 \land n \leq 10 \]

  - Example: "n is divisible by 4"
    \[ n \% 4 == 0 \]

  - Example: "n is a leap year"
    \[ n \div 4 == 0 \land n \div 100 \neq 0 \lor n \div 400 == 0 \]
Conditions:

- Relational operators: <, >, <=, >=, ==, !=
- Logical operators: && (and), || (or), ! (not)
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Conditions:

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- Example: “n lies in the interval 1...10”
  
  n >= 1 && n <= 10
Conditions:

- Relational operators: <, >, <=, >=, ==, !=
- Logical operators: && (and), || (or), ! (not)
- Example: “n lies in the interval 1...10”
  \[ n \geq 1 \land n \leq 10 \]
- Example: “n is divisible by 4”
Conditions:

- Relational operators: <, >, <=, >=, ==, !=
- Logical operators: && (and), || (or), ! (not)
- Example: “n lies in the interval 1...10”
  \[ n \geq 1 \land n \leq 10 \]
- Example: “n is divisible by 4”
  \[ n \% 4 == 0 \]
Conditions:

- Relational operators: <, >, <=, >=, ==, !=
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- Example: “$n$ lies in the interval 1...10”
  \[ n \geq 1 \land n \leq 10 \]
- Example: “$n$ is divisible by 4”
  \[ n \% 4 = 0 \]
- Example: “$n$ is a leap year”
Conditions:

- Relational operators: `<`, `>`, `<=`, `>=`, `==`, `!=`
- Logical operators: `&&` (and), `||` (or), `!` (not)
- Example: “n lies in the interval 1…10”
  
  \[ n \geq 1 \land n \leq 10 \]
- Example: “n is divisible by 4”
  
  \[ n \% 4 == 0 \]
- Example: “n is a leap year”
  
  \[ n \text{ is divisible by 4}; \text{ exception: } n \text{ is divisible by 100}; \text{ exception to the exception: } n \text{ is divisible by 400} \]
Conditions:

- Relational operators: <, >, <=, >=, ==, !=
- Logical operators: && (and), || (or), ! (not)
- Example: “$n$ lies in the interval 1 . . . 10”
  \[ n \geq 1 \land n \leq 10 \]
- Example: “$n$ is divisible by 4”
  \[ n \% 4 == 0 \]
- Example: “$n$ is a leap year”
  $n$ is divisible by 4; exception: $n$ is divisible by 100; exception to the exception: $n$ is divisible by 400
  \[ (n \% 4 == 0 \land n \% 100 \neq 0) \lor n \% 400 == 0 \]
The boolean data type:

```java
boolean isLeapYear =
    (n % 4 == 0 && n % 100 != 0) || n % 400 == 0;

...

if (isLeapYear) {
    ...
}
```
Potential ambiguity:

```plaintext
if ( C1 )
    if ( C2 )
        S
    else
        S'
```
Potential ambiguity:

```java
if ( C1 )
    if ( C2 )
        S
    else
        S'
else
    S'
```

VS:

```java
if ( C1 ) {
    if ( C2 )
        S
} else
    S'
```
Indentation conventions:

```java
if ( C ) {
    <then part>
}
else {
    <else part>
}
```
Indentation conventions:

if ( C ) {
   <then part>
}
else {
   <else part>
}

Cascading if/then/else:

if ( C1 ) {
   <action 1>
}
else if ( C2 ) {
   <action 2>
}
...
else if ( Cn ) {
   <action Sn>
}
else {
   <default action>
}
Time1.java
The Switch Statement

switch ( <integer expression> ) {
    case <value 1> :
        <action 1>
        break;

    case <value 2> :
        <action 2>
        break;

    ...

    case <value n> :
        <action n>
        break;

    default:
        <default action>
}
Time2.java
The conditional operator:

<boolean expression>  ?  <expression>  :  <expression>

// x = max(a, b)

if (b > a)
    x = b;
else
    x = a;
The conditional operator:

```
<boolean expression> ? <expression> : <expression>
```

// x = max(a, b)

```
if (b > a) 
    x = b;
else 
    x = a;
```

...or...

```
x = b > a ? b : a;
```