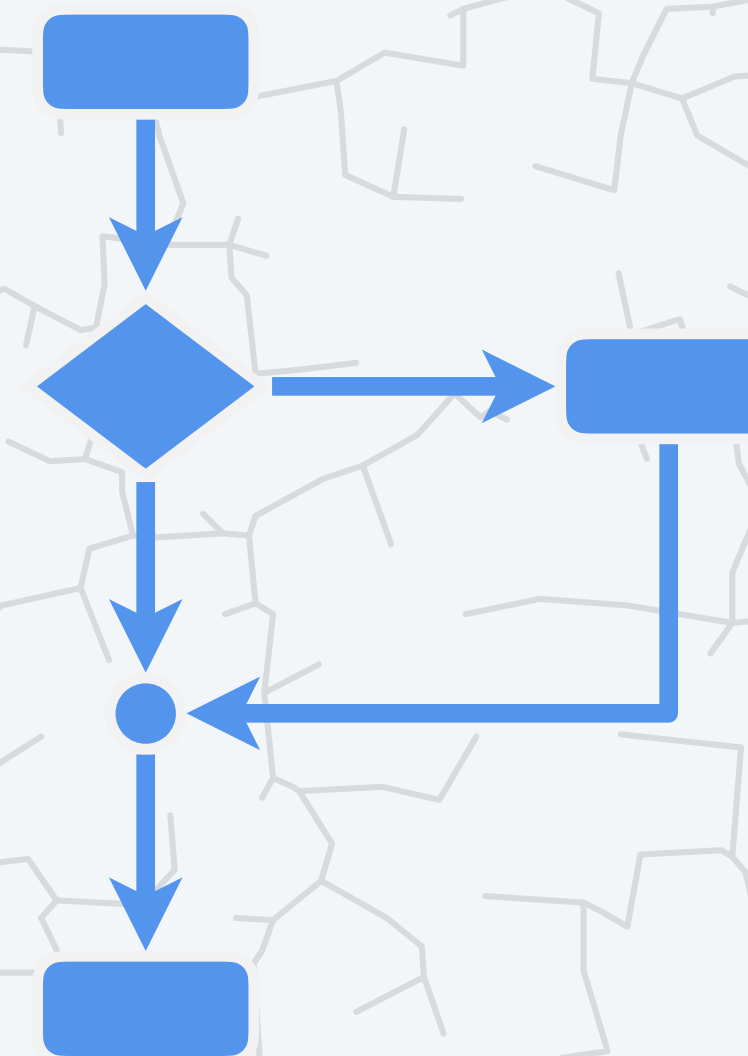


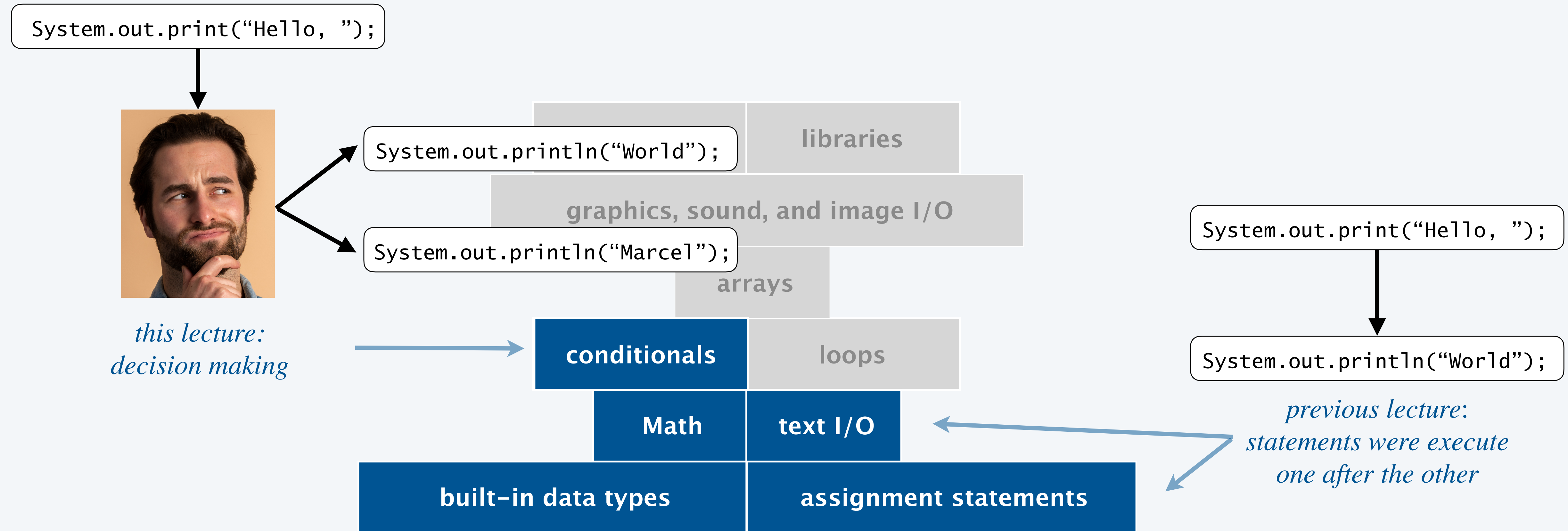
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1.3 CONDITIONALS

- ▶ *if statements*
- ▶ *if–else statements*
- ▶ *nested conditionals*
- ▶ *year-to-speech*

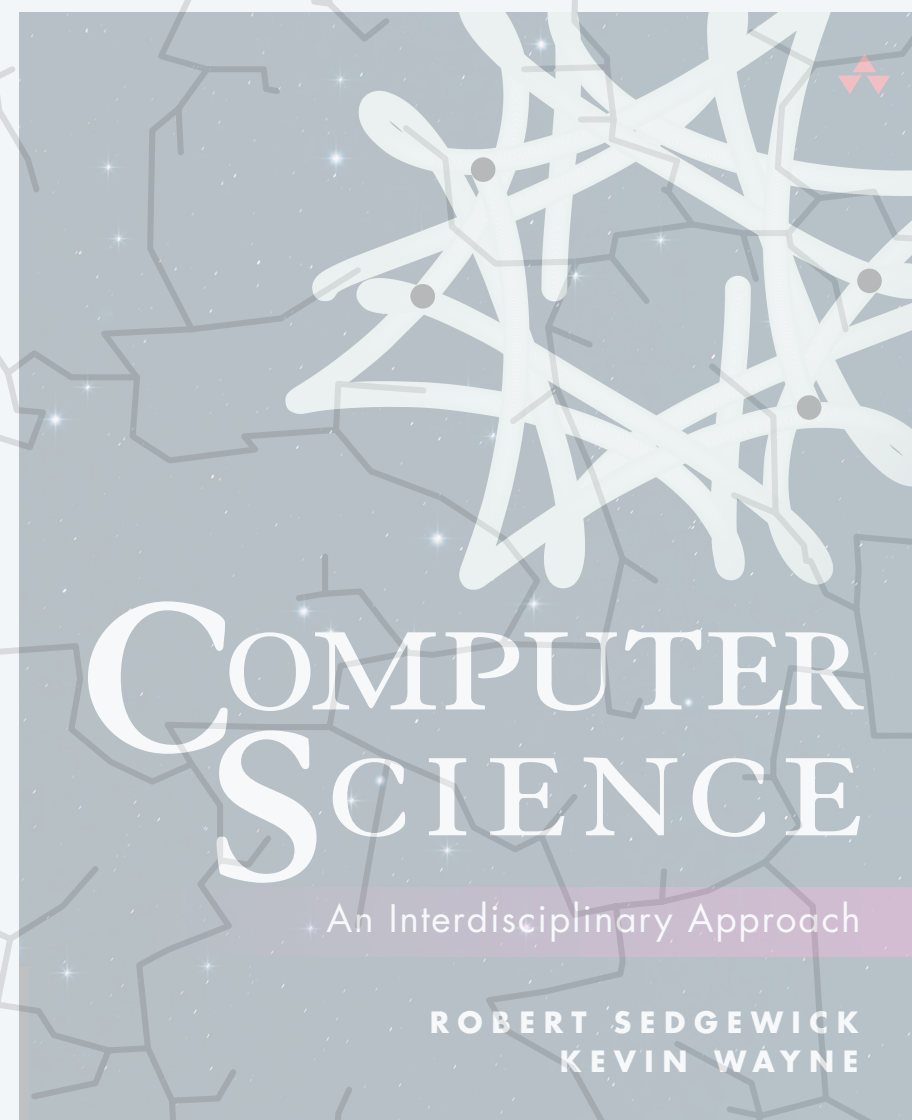


Basic building blocks for programming



Review

- 1) What can we write to test for equality between two integers?
- 2) What about strings?
- 3) What are some examples of comparison operators besides equality?
- 4) Truth table recap



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1.3 CONDITIONALS

- ▶ *if statements*
- ▶ *if-else statements*
- ▶ *nested conditionals*
- ▶ *a note on access and accessibility*

Conditional Statements

Statements that resemble “if p , then q ”

- E.g., “If today’s Yeh dining hall menu is good, then I will eat there today.”
- Pseudocode:

```
if (menuToday == good)
    eatAtYeh = True
```

```
if (<boolean expression>) {
    <statement 1>
    <statement 2>
}
```

if statement template

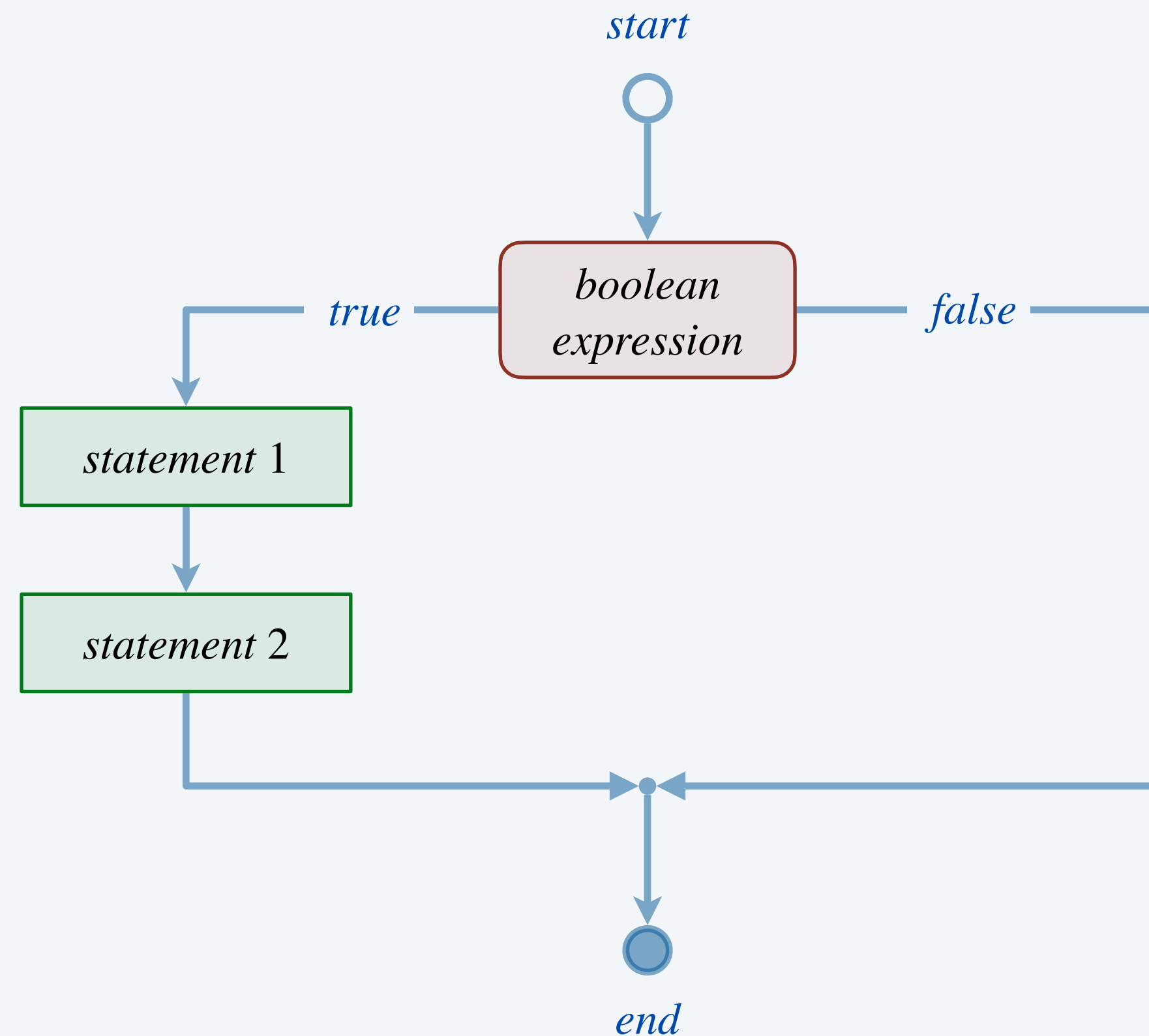
The *if* statement

Execute certain statement(s) depending on the value of a boolean expression.

- Evaluate a boolean expression.
- If true, execute statements in **code block** delimited by curly braces.

```
if (<boolean expression>) {  
    <statement 1>  
    <statement 2>  
}
```

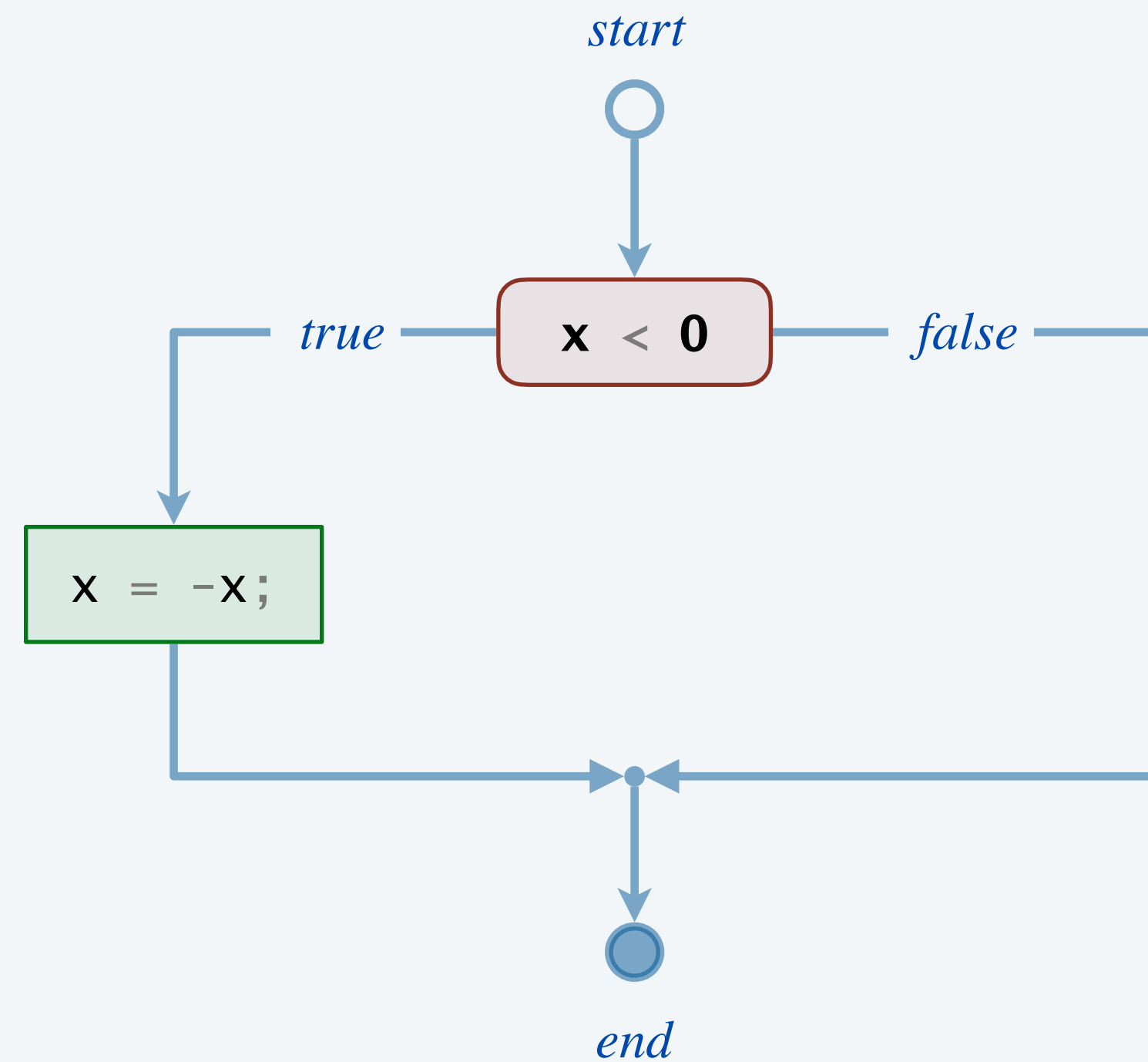
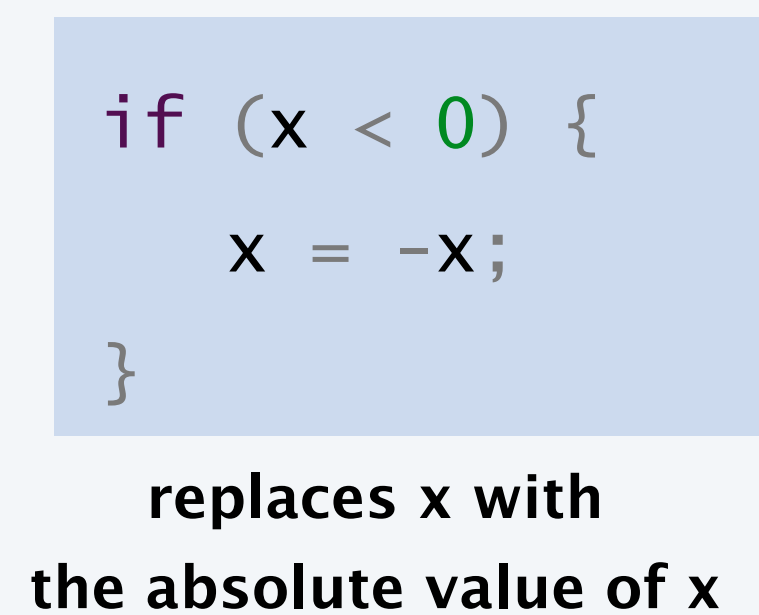
if statement template



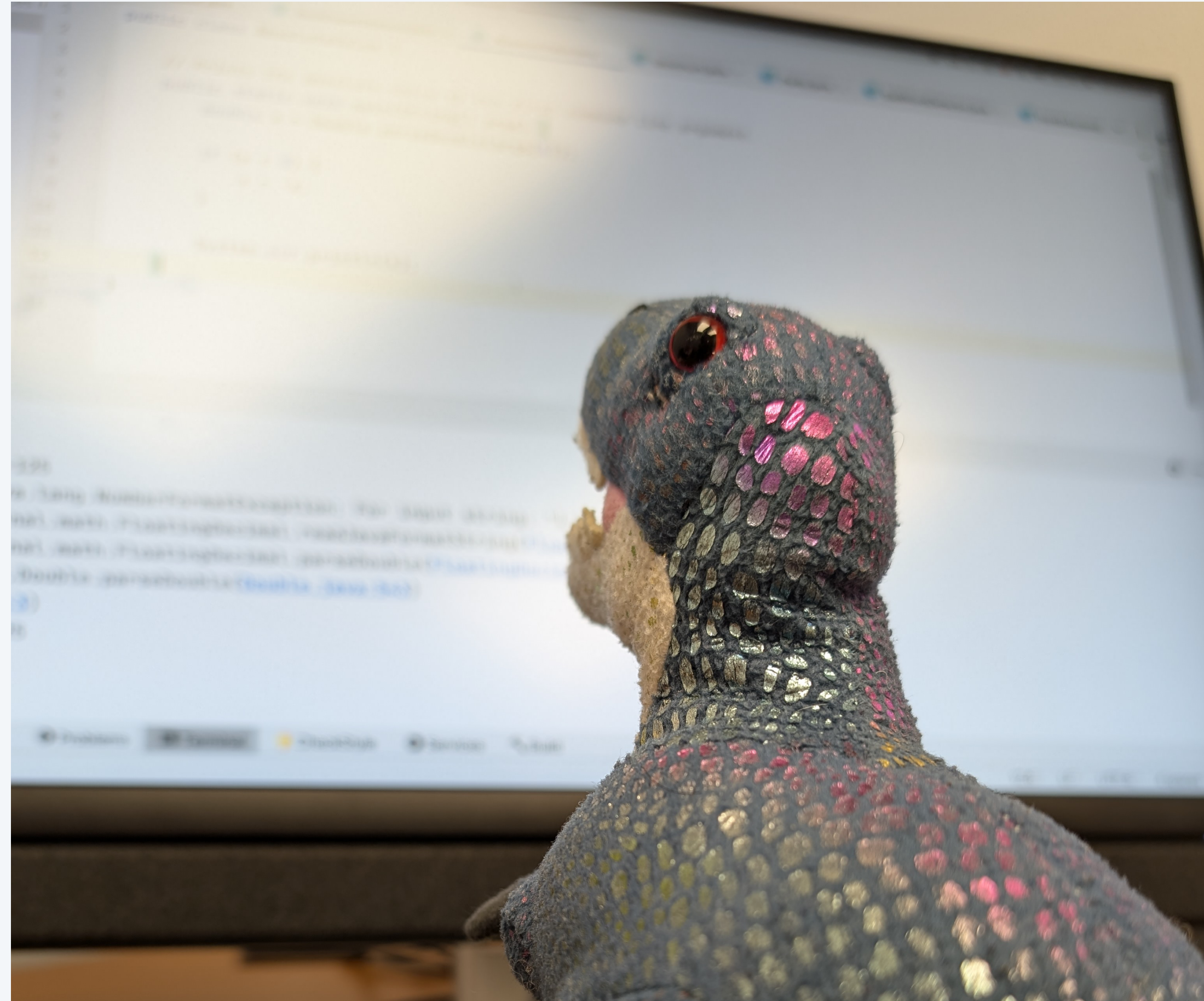
The *if* statement

Execute certain statement(s) depending on the value of a boolean expression.

- Evaluate a boolean expression.
- If true, execute statements in **code block** delimited by curly braces.



More examples of *if* statements





What is the result of compiling and executing the following program?

- A. 6
- B. 12
- C. *Program does not compile.*
- D. *Run-time error.*
- E. *None of the above.*

```
public class Mystery1 {  
    public static void main(String[] args) {  
        int a = 12;  
        int b = 6;  
  
        if (b < a) {  
            int temp = a;  
            a = b;  
            b = temp;  
        }  
  
        System.out.println(a);  
    }  
}
```



What is the result of compiling and executing the following program?

- A. 6
- B. 12
- C. *Program does not compile.*
- D. *Run-time error.*
- E. *None of the above.*

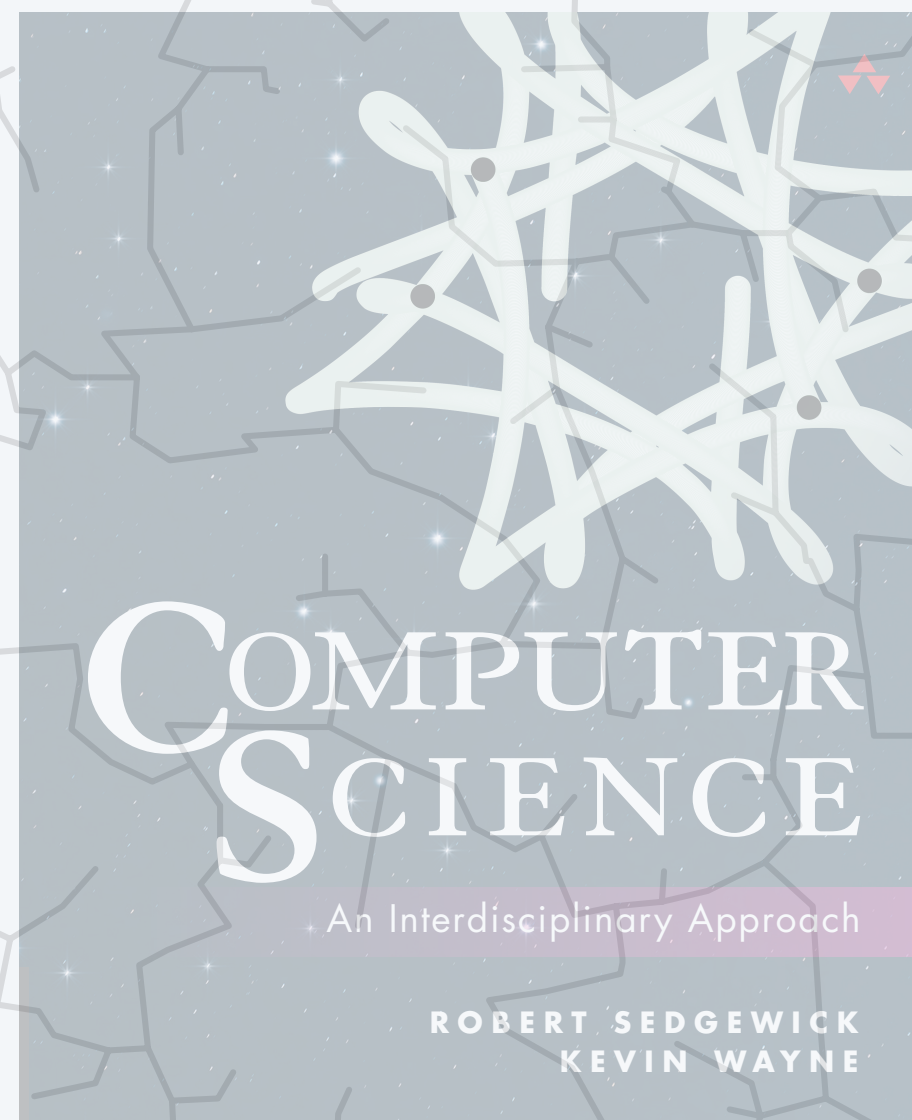
```
public class Mystery1 {  
    public static void main(String[] args) {  
        int a = 12;  
        int b = 6;  
  
        if (b < a) {  
            int temp = a;  
            a = b;  
            b = temp;  
        }  
  
        System.out.println(temp);  
    }  
}
```



What does the following code fragment print?

```
int x = -125;  
if (x > 0); {  
    System.out.println("positive");  
}
```

- A. "positive"
- B. *nothing*
- C. *compile-time error*
- D. *run-time exception*



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1.3 CONDITIONALS

- ▶ *if statements*
- ▶ ***if–else statements***
- ▶ *nested conditionals*
- ▶ *a note on access and accessibility*

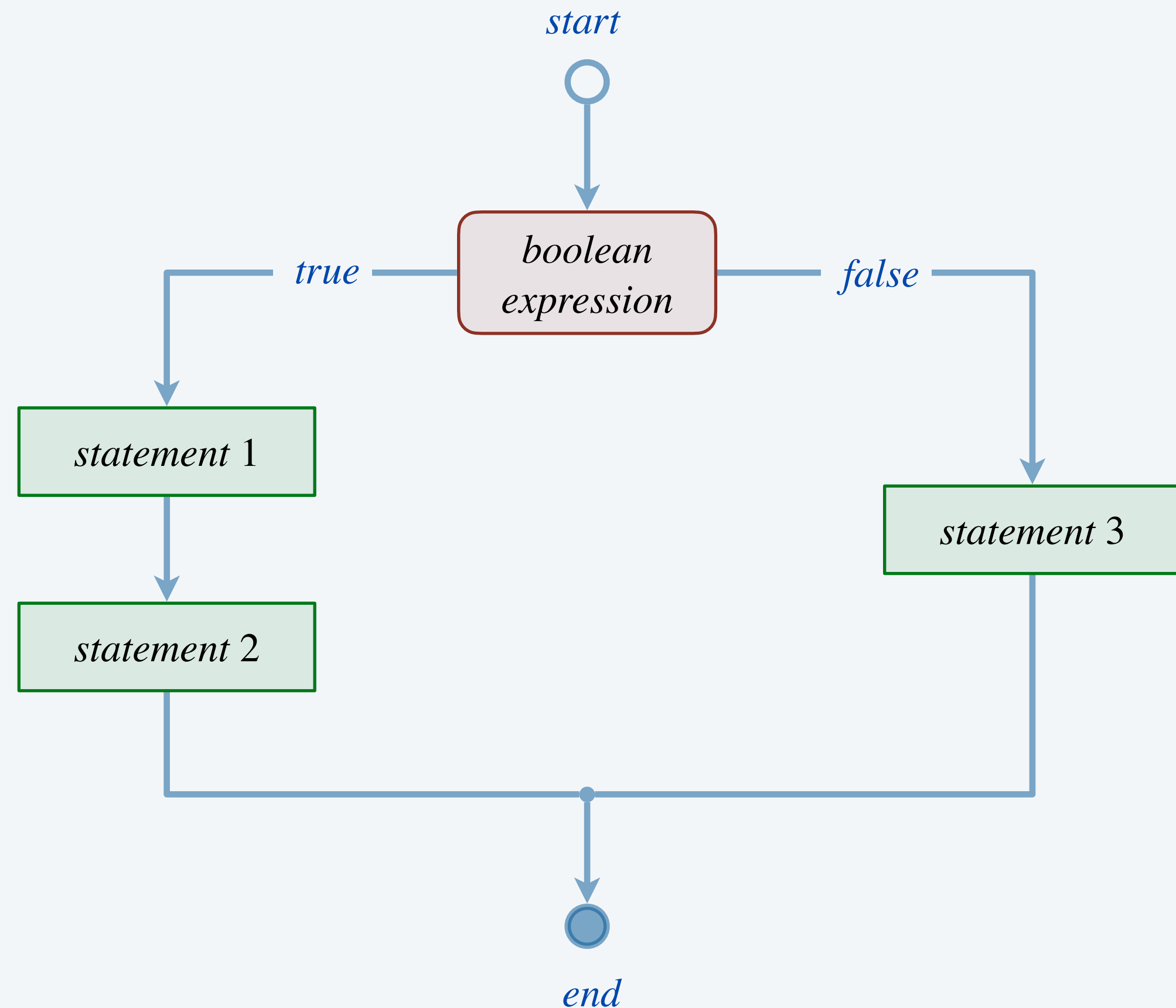
The *if-else* statement

Execute certain statements depending on the value of a boolean expression.

- Evaluate a boolean expression.
- If true, execute some statements.
- Otherwise, execute different statements. ← *the else clause*

```
if (<boolean expression>) {  
    <statement 1>  
    <statement 2>  
}  
else {  
    <statement 3>  
}
```

if-else statement template



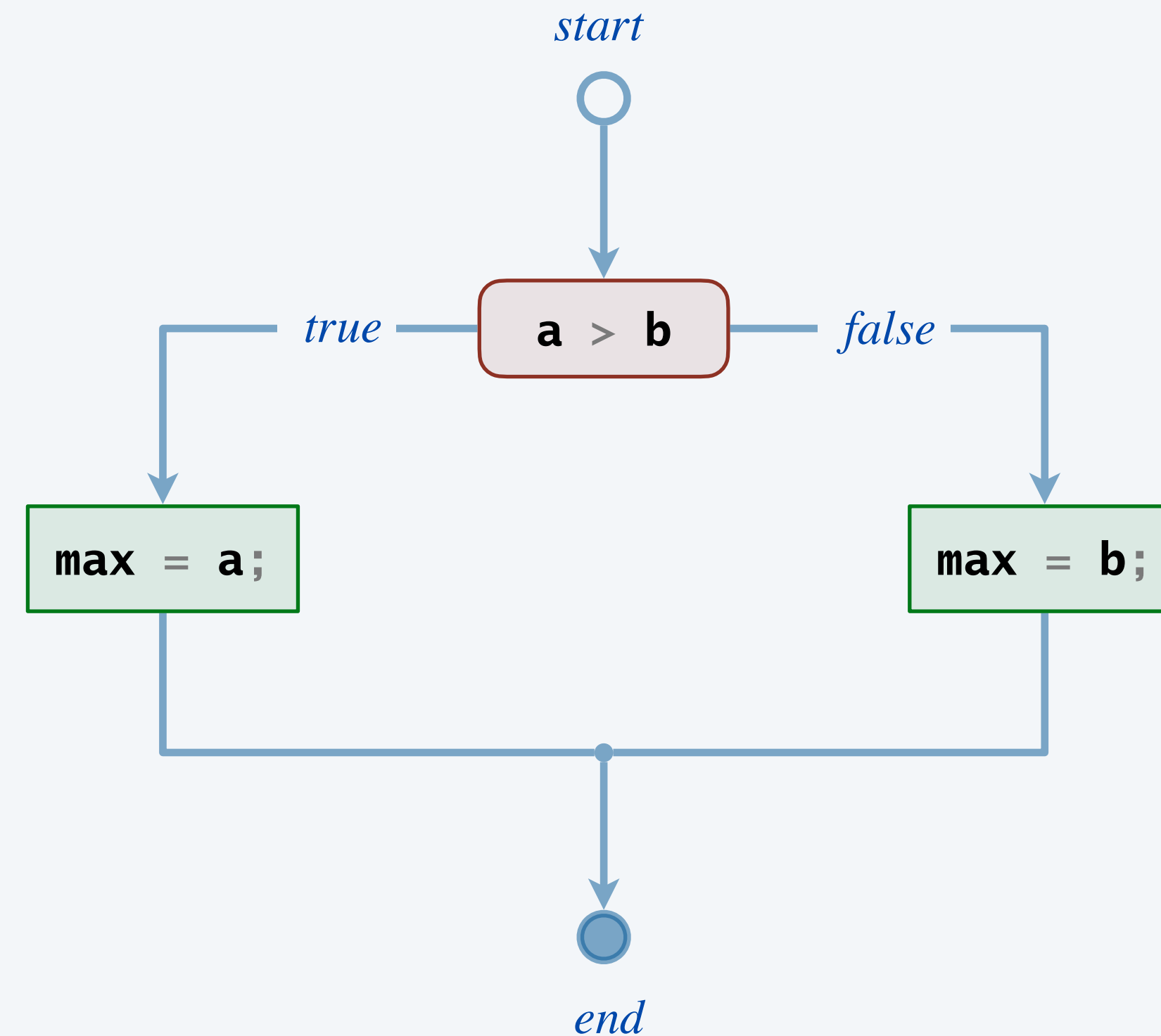
The *if-else* statement

Execute certain statements depending on the value of a boolean expression.

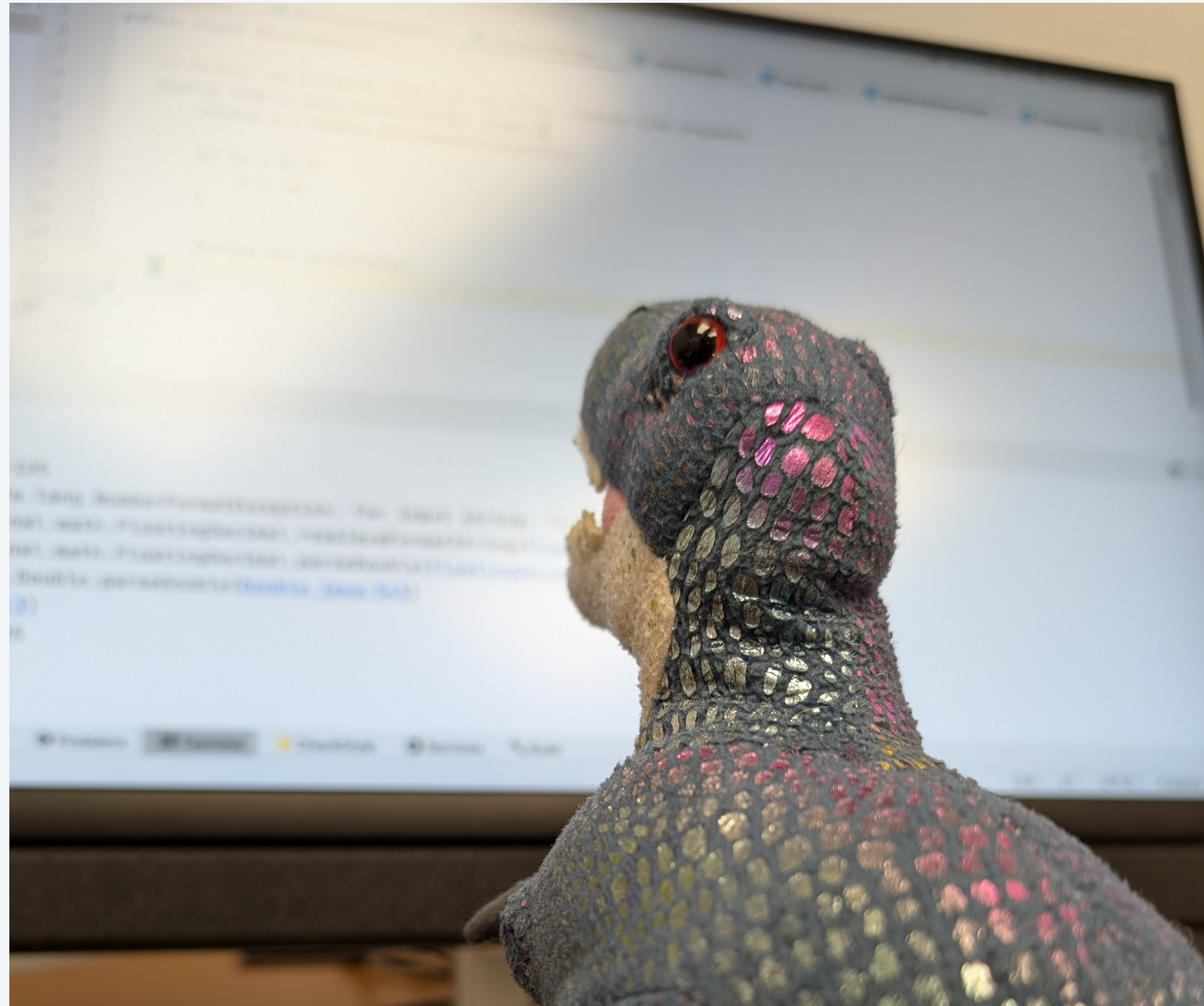
- Evaluate a boolean expression.
- If true, execute some statements.
- Otherwise, execute different statements. ← *the else clause*

```
int max;  
if (a > b) {  
    max = a;  
}  
else {  
    max = b;  
}
```

sets max to the
maximum of a and b



More examples of *if-else* statements

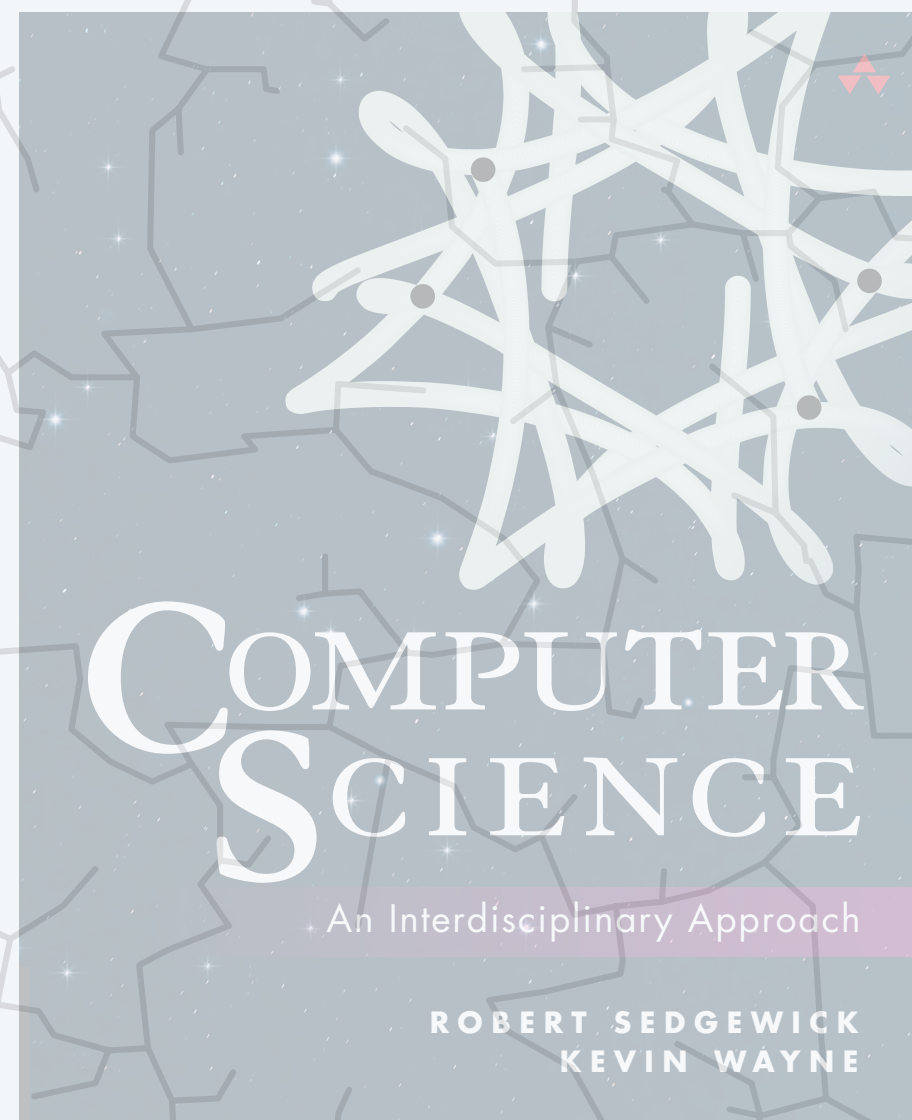




What does the following code fragment print?

```
boolean a = false;  
if (a = true) System.out.println("yes");  
else          System.out.println("no");
```

- A. "yes"
- B. "no"
- C. *compile-time error*
- D. *run-time exception*



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1.3 CONDITIONALS

- ▶ *if statements*
- ▶ *if–else statements*
- ▶ ***nested conditionals***
- ▶ *a note on access and accessibility*



Nesting conditionals: sign function

Sign function.

```
public class Sign {  
    public static void main(String[] args) {  
        double x = Double.parseDouble(args[0]);  
  
        if (x == 0.0) {  
            System.out.println(0.0);  
        }  
        else {  
            if (x > 0.0) {  
                System.out.println(1.0);  
            }  
            else {  
                System.out.println(-1.0);  
            }  
        }  
    }  
}
```

$$\text{sign}(x) = \begin{cases} -1 & \text{if } x < 0 \\ 0 & \text{if } x = 0 \\ +1 & \text{if } x > 0 \end{cases}$$

*if-else statement nested
within the else clause
of an if statement*

```
~/cos126/conditionals> java Sign 0  
0.0  
  
~/cos126/conditionals> java Sign -89  
-1.0
```

Multiway selection shorthand

Note. Curly braces not needed here since each body consists of a single statement.

```
public class Sign {
    public static void main(String[] args) {
        double x = Double.parseDouble(args[0]);
        double sign;

        if (x == 0.0) sign = 0.0;
        else if (x > 0.0) sign = 1.0;
        else sign = -1.0;

        System.out.println(sign);
    }
}
```

← 3 mutually exclusive alternatives

$$\text{sign}(x) = \begin{cases} -1 & \text{if } x < 0 \\ 0 & \text{if } x = 0 \\ +1 & \text{if } x > 0 \end{cases}$$

```
~/cos126/conditionals> java Sign 0
0.0

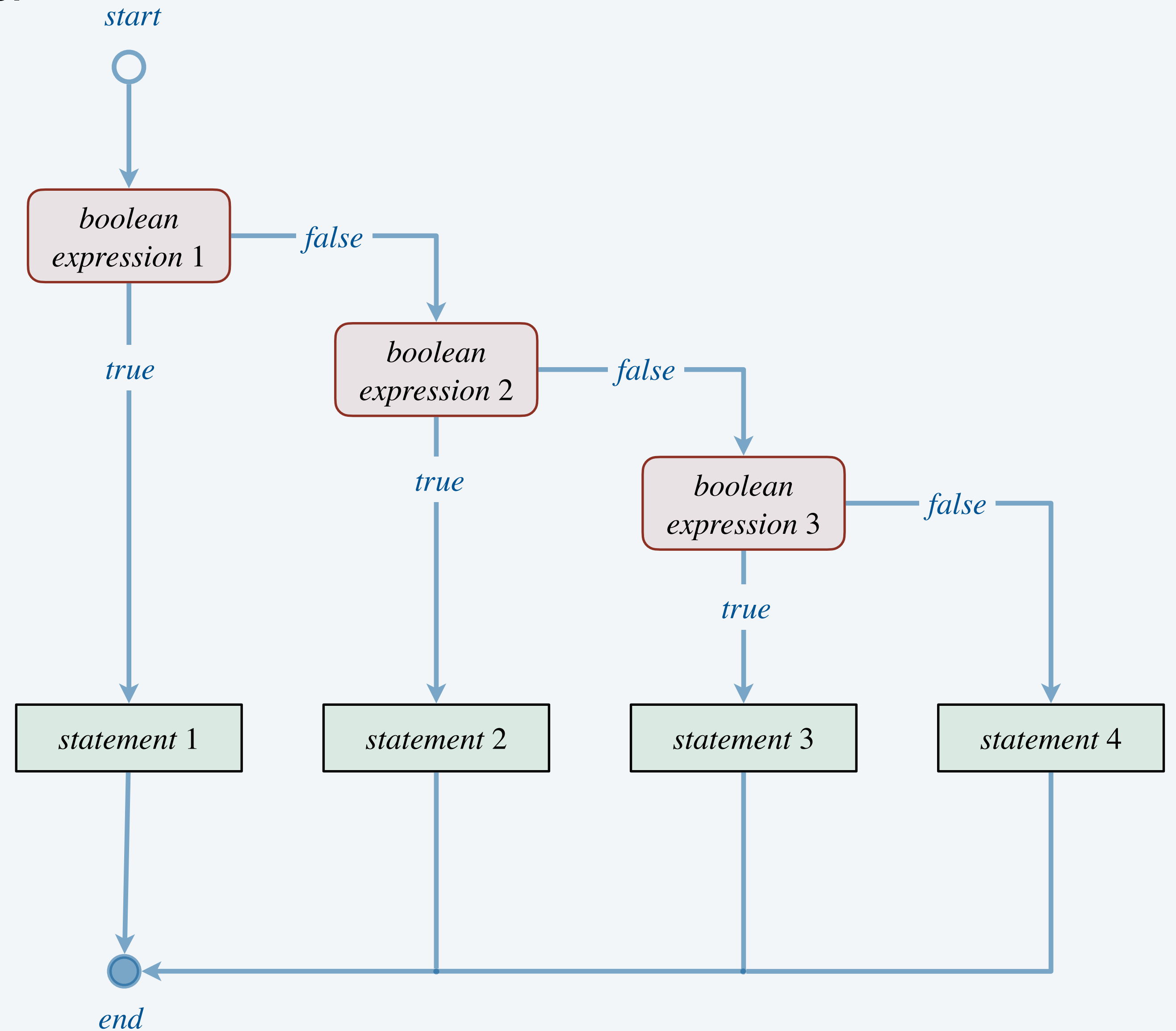
~/cos126/conditionals> java Sign -89
-1.0
```

A ladder of nested *if-else* statements

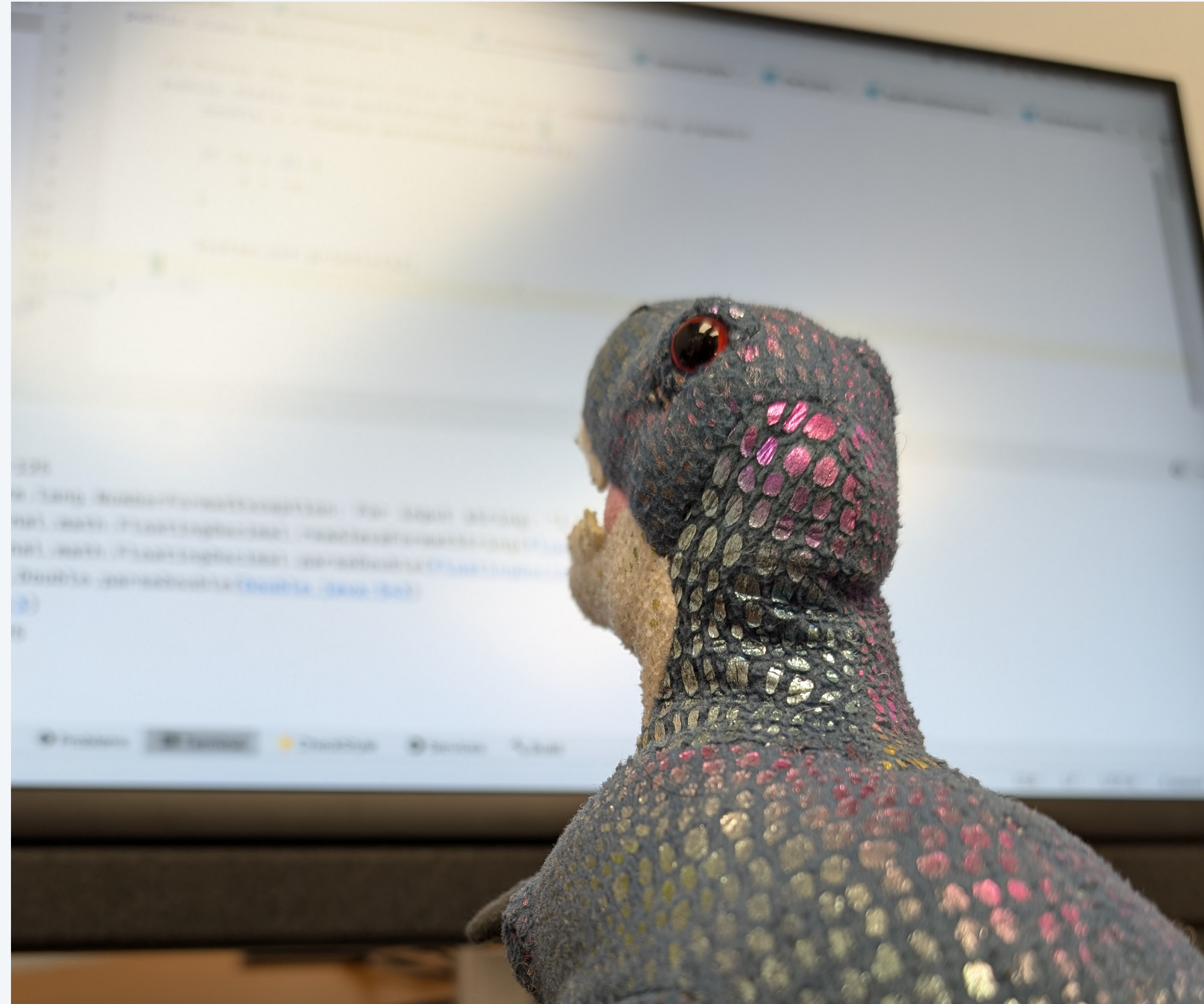
Multiway selection. Mutually exclusive alternatives.

```
if (<boolean expression 1>) {  
    <statement 1>  
}  
else if (<boolean expression 2>) {  
    <statement 2>  
}  
else if (<boolean expression 3>) {  
    <statement 3>  
}  
else {  
    <statement 4>  
}
```

if-else ladder template



More examples of nested conditionals





What will the following code fragment print if `r` is `0.453125`?

- A. -1
- B. 4
- C. 5
- D. 6

```
double r = 0.453125;  
int roll = -1;  
if (r < 0.125) roll = 1;  
if (r < 0.250) roll = 2;  
if (r < 0.375) roll = 3;  
if (r < 0.500) roll = 4;  
if (r < 0.625) roll = 5;  
if (r < 1.000) roll = 6;
```

Nested *if* statements

Design principle. Avoid unnecessary/gratuitous nesting of *if* statements.

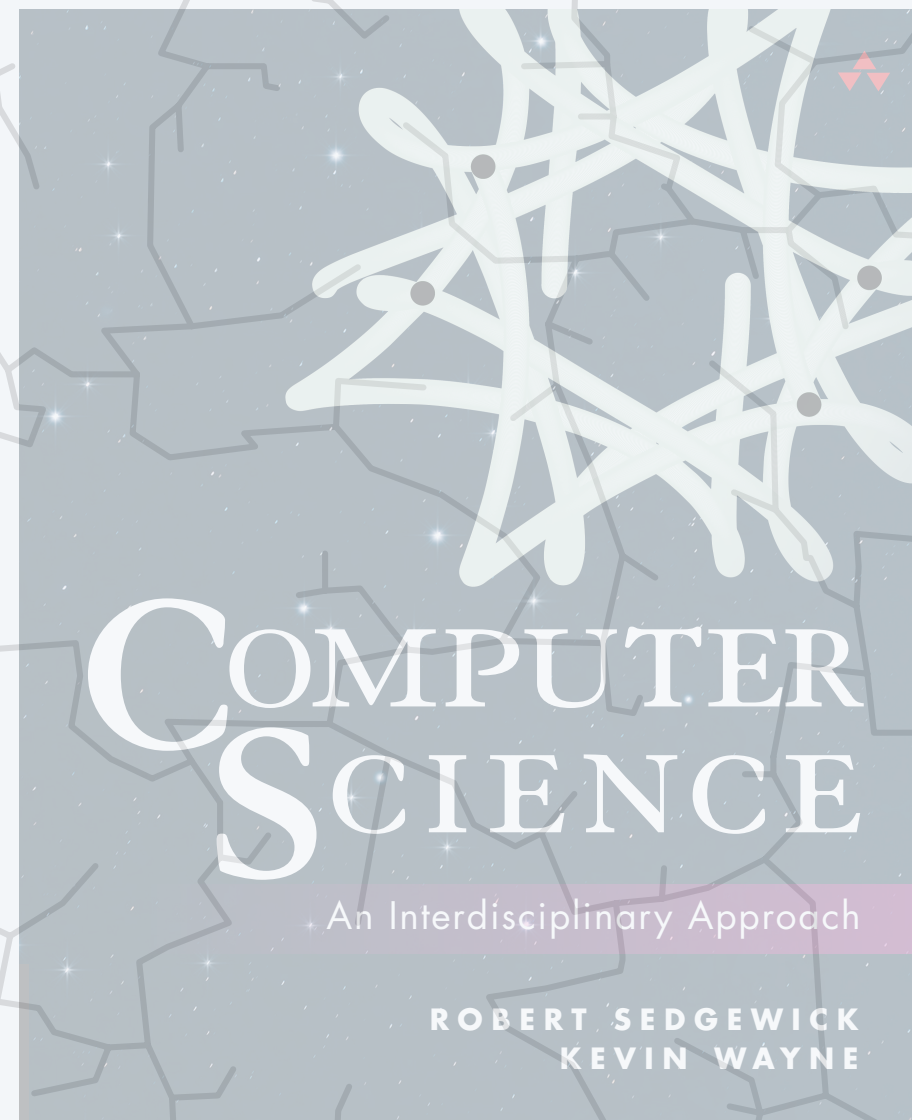
```
if (r == 0) {  
    if (g == 0) {  
        if (b == 0) {  
            System.out.println("black");  
        }  
    }  
}
```

bad design (gratuitous nesting)



```
if (r == 0 && g == 0 && b == 0) {  
    System.out.println("black");  
}
```

easier to read and debug



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1.3 CONDITIONALS

- ▶ *if statements*
- ▶ *if-else statements*
- ▶ *nested conditionals*
- ▶ ***a note on access and accessibility***

Barriers to Access and Accessibility

Barriers to Access. 25% of high school and college-aged youth worldwide cannot access the internet.

- ▶ Affordability
- ▶ Infrastructure
- ▶ Interest
- ▶ Communication



Barriers to Accessibility. Obstacles for people with a wider range of abilities. We will focus on web access.

- ▶ Technology barriers
- ▶ Communication
- ▶ Site Policy
- ▶ Inaccessible Media Formats

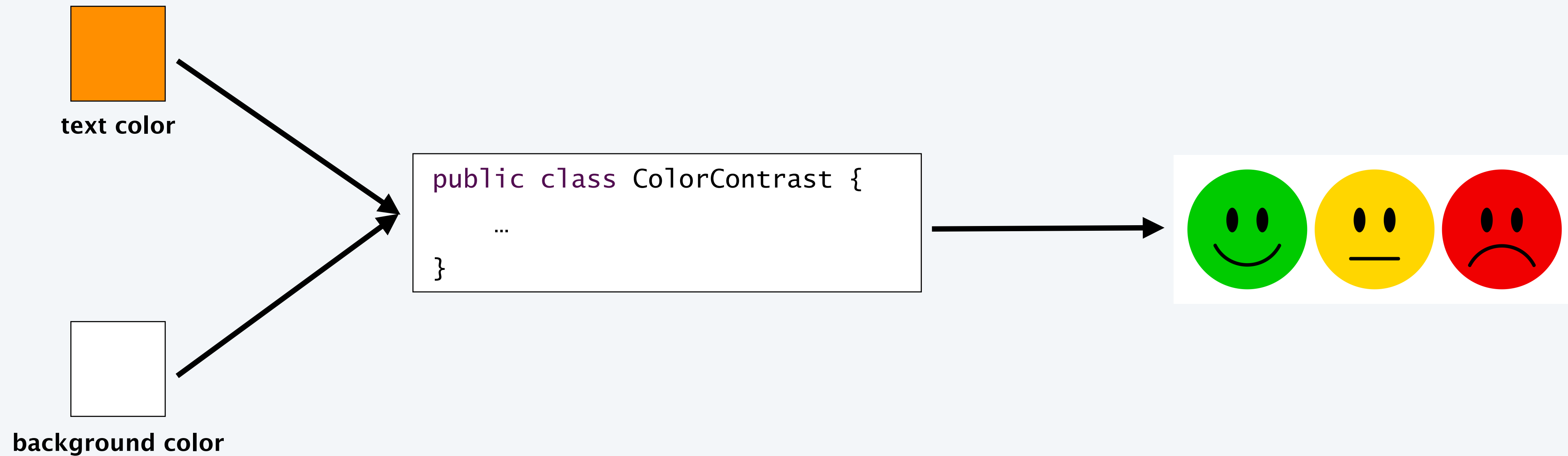


To change directory

```
kevinnegy@kevinnegy-MS-7B85:~/repos/cos125/precept1$ cd ..
kevinnegy@kevinnegy-MS-7B85:~/repos/cos125$ cd precept1/
kevinnegy@kevinnegy-MS-7B85:~/repos/cos125/precept1$ ls
'COS 125.iml'  Mystery.java  Sum.java
kevinnegy@kevinnegy-MS-7B85:~/repos/cos125/precept1$ javac-introcs Sum.java
kevinnegy@kevinnegy-MS-7B85:~/repos/cos125/precept1$ java-introcs Sum 1 2
3
```

□

A note on your assignment



Hello World!

Credits

media	source	License
<i>Man pondering</i>	<u>Adobe Stock</u>	<u>education license</u>
<i>Bugs</i>	<u>Adobe Stock</u>	<u>education license</u>
<i>Russian Nesting Dolls</i>	<u>Adobe Stock</u>	<u>education license</u>
<i>Watering Can</i>	<u>Katerina Kamprani</u>	
<i>Children with laptops</i>	<u>Adobe Stock</u>	<u>education license</u>
<i>WCAG</i>	<u>Adobe Stock</u>	<u>education license</u>
<i>Feedback faces</i>	<u>Adobe Stock</u>	<u>education license</u>