

CSE 20

Intro to Computing I

Lecture 4 – Control Flow

Announcements

- ▶ Lab #5 this week
 - Due before your next lab
- ▶ Reading assignment
 - Chapter 3.1 – 3.6 of textbook



Christopher Alarcon

COME MEET UC MERCED'S **EMPLOYER
RELATIONS AND INTERNSHIP COORDINATOR**
AS HE PROVIDES US WITH HELPFUL
TIPS IN THE WORK FIELD

7:00pm ~ COB2 170
September 28

Difference between 2 numbers

What if the result
is negative?

```
System.out.print("Input the first number: ");
```



```
a = in.nextInt();
```



```
System.out.print("Input the second number: ");
```



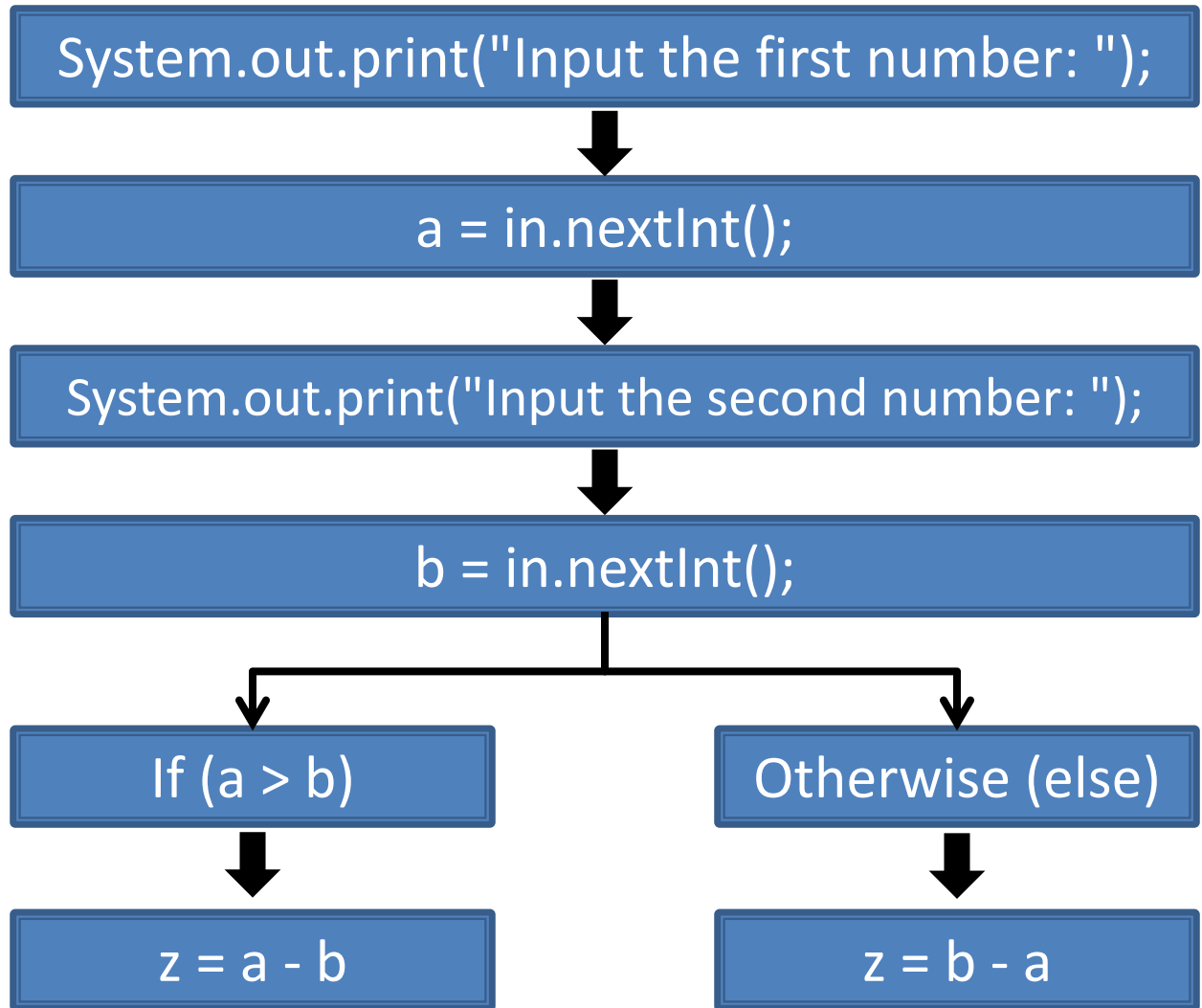
```
b = in.nextInt();
```



```
System.out.print("Their difference: " + (a - b));
```

Absolute Difference : 2-way

Making a decision



Absolute Difference : 2-way

```
System.out.print("Input the first number: ");  
a = in.nextInt();  
System.out.print("Input the second number: ");  
b = in.nextInt();
```

```
if (a > b)
```

```
    z = a - b;
```

```
else
```

```
    z = b - a;
```

Expression

If branch

Else branch

Conditional Statements

If-Else : Summary

- ▶ **Expression** only appears **INSIDE** if statement
- ▶ If branch
 - Expression is **true** then “take” IF path (or branch)
 - Required to conditionally do an action
- ▶ Else branch (optional)
 - Expression is **false** then “take” ELSE path (or branch)
 - Only added if an **alternative** action is needed
- ▶ **ONLY** one branch is taken
 - Either-Or Structure

Syntax

```
if (expression)  
    System.out.println("Do the if action only");
```

```
if (expression)  
    System.out.println("Do the if action");  
else // OR  
    System.out.println("Do the else action");
```

```
if (expression); // Don't put semicolon!!  
    // This line will run!  
else  
    System.out.println("It's not true!");
```

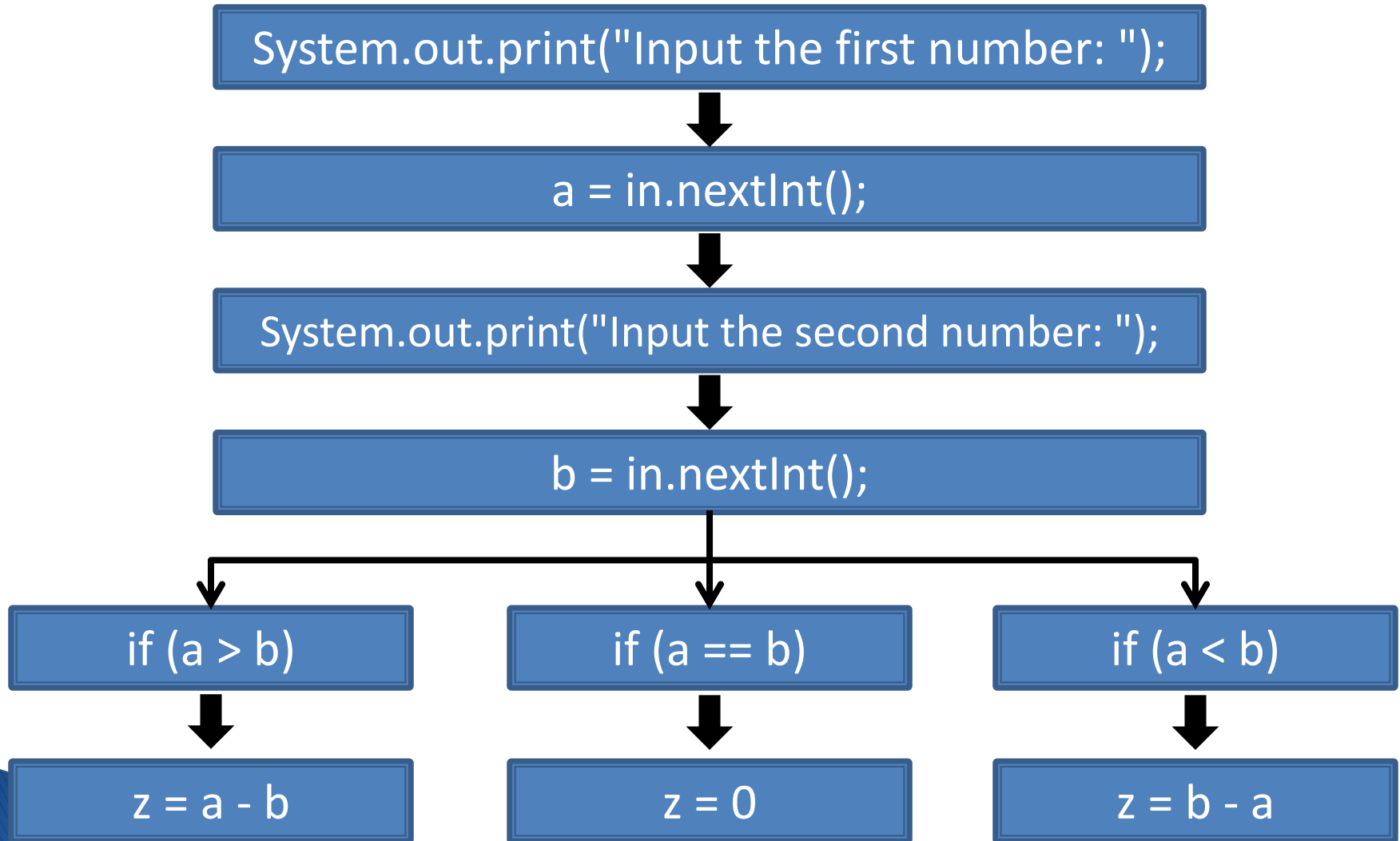

Boolean - Not

- ▶ **!**
 - !true → false
 - !false → true
 - !same → different
- ▶ **!(a == b)**
 - a != b
- ▶ **!(a > b)**
 - a <= b
- ▶ **!(a >= b)**
 - a < b

$a == b$
⇓

is a same as b?

Absolute Difference : 3-way



Absolute Difference : Nested

```
System.out.print("Input the first number: ");  
a = in.nextInt();  
System.out.print("Input the second number: ");  
b = in.nextInt();
```

```
if (a > b)
```

```
    z = a - b;
```

```
else if (a == b)
```

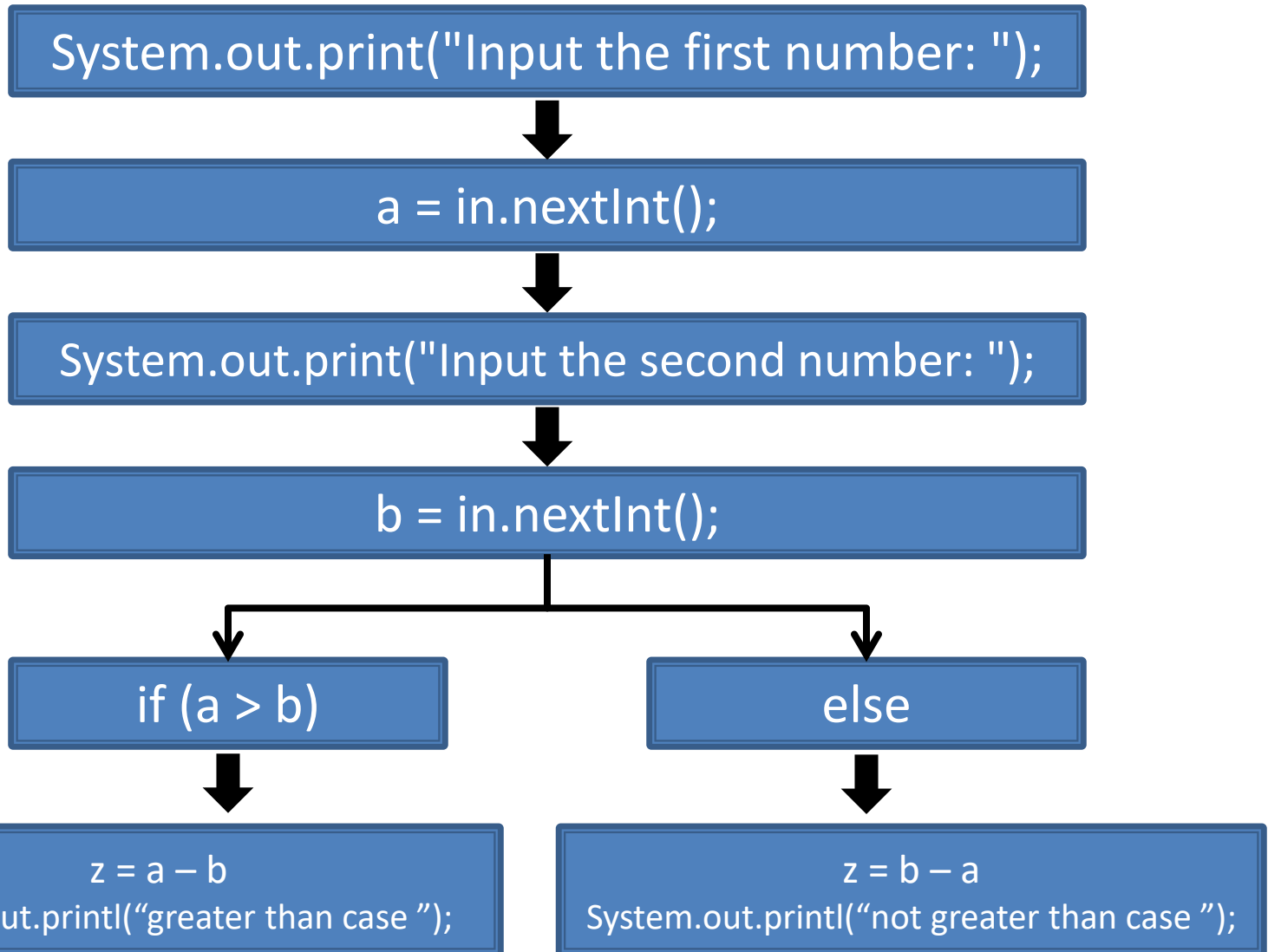
```
    z = 0;
```

```
else
```

```
    z = b - a;
```

Do we need to test if (a < b)?

Absolute Difference : Block

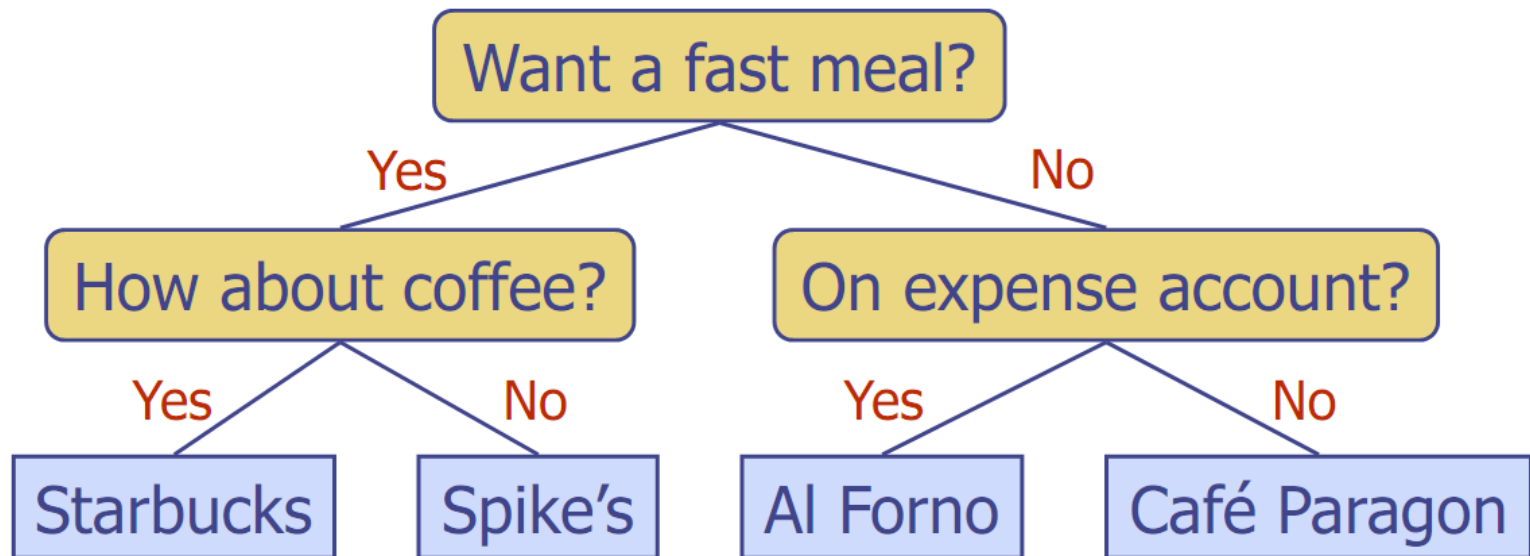


Absolute Difference : Block

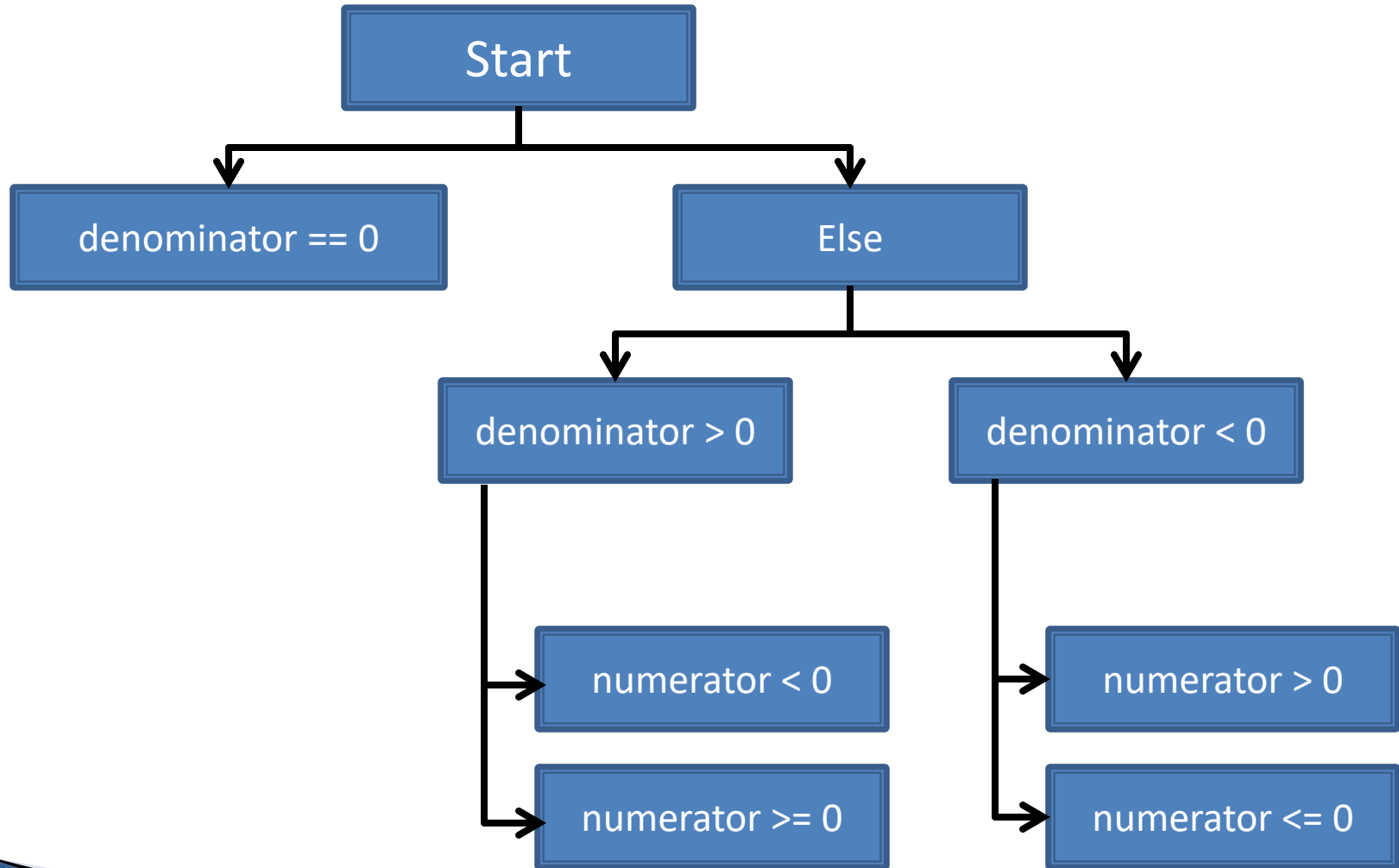
```
System.out.print("Input the first number: ");
a = in.nextInt();
System.out.print("Input the second number: ");
b = in.nextInt();
if (a < b) {
    z = b - a;
    System.out.print("less than case ");
    System.out.println("results in " + z);
} else {
    z = a - b;
    System.out.print("not less than case ");
    System.out.println("results in " + z);
}
```

Use { } to enclose a block of statements in a branch

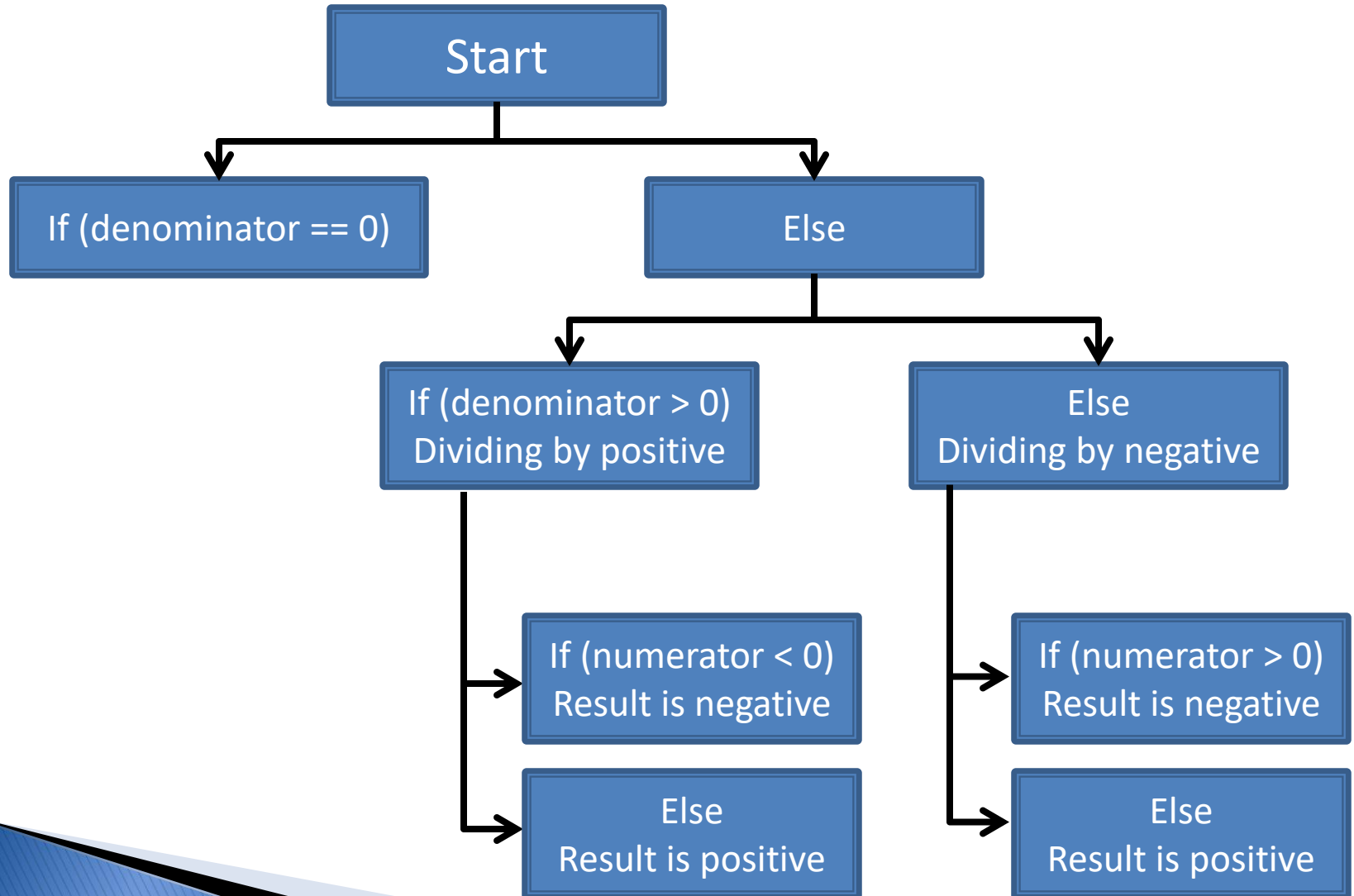
Decision Tree (Artificial Intelligence):



Decision Tree: diving two numbers



Decision Tree: If-else Structure



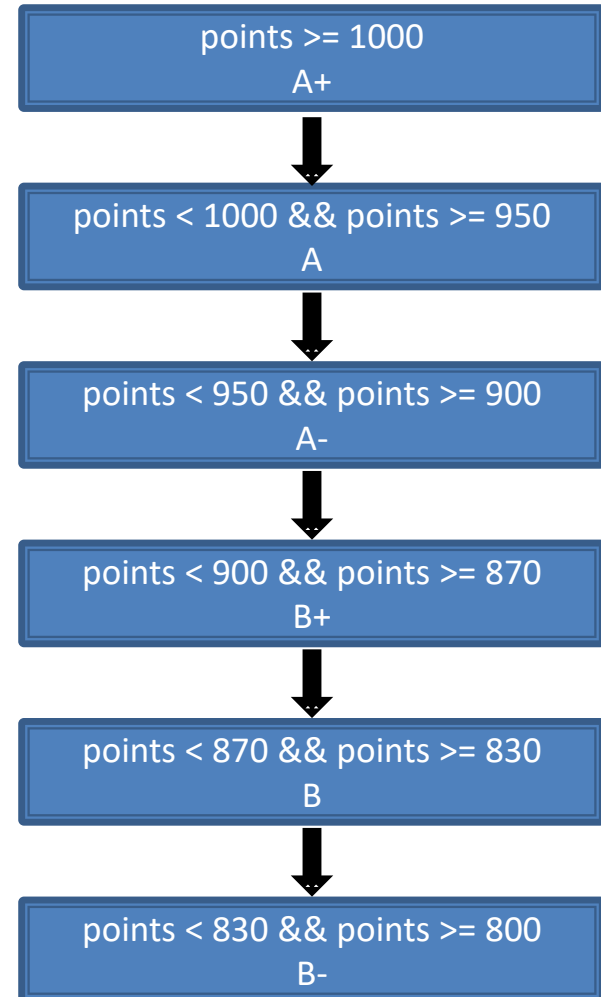
Decision Tree: Code

```
if (denominator == 0)
    System.out.println("Dividing by zero!");
else if (denominator > 0) {
    System.out.println("Dividing by positive");
    if (numerator < 0)
        System.out.println("Result is negative");
    else
        System.out.println("Result is positive");
} else {
    System.out.println("Dividing by negative");
    if (numerator > 0)
        System.out.println("Result is negative");
    else
        System.out.println("Result is positive");
}
```

Points to Grade Conversion(1)

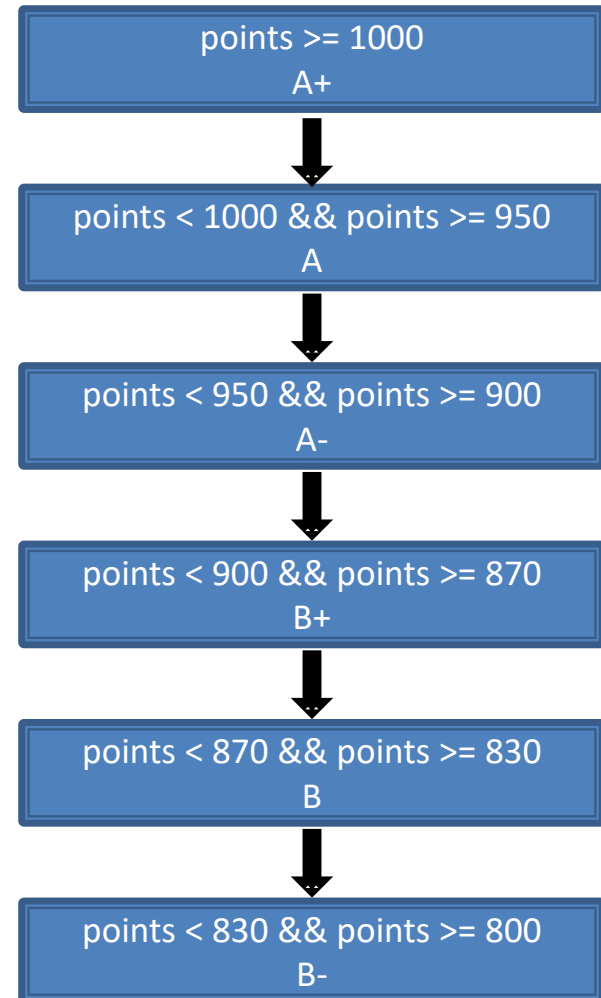
What's wrong?

```
if (points >= 1000)
    grade = "A+";
if (points < 1000 && points >= 950)
    grade = "A";
if (points < 950 && points >= 900)
    grade = "A-";
if (points < 900 && points >= 870)
    grade = "B+";
if (points < 870 && points >= 830)
    grade = "B";
if (points < 830 && points >= 800)
    grade = "B-";
```



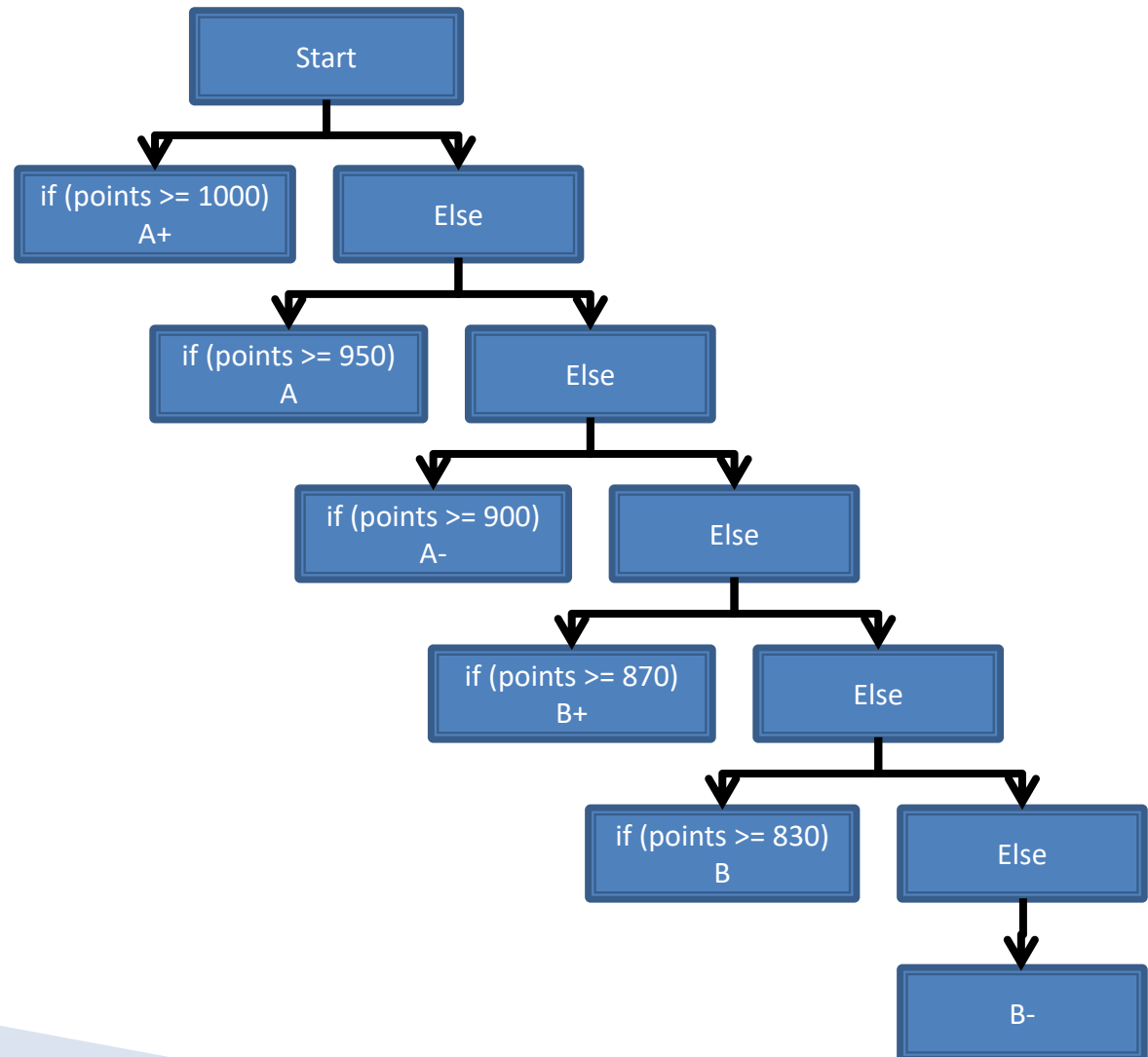
Points to Grade Conversion (2)

```
if (points >= 1000)
    grade = "A+";
else if (points < 1000 && points >= 950)
    grade = "A";
else if (points < 950 && points >= 900)
    grade = "A-";
else if (points < 900 && points >= 870)
    grade = "B+";
else if (points < 870 && points >= 830)
    grade = "B";
else if (points < 830 && points >= 800)
    grade = "B-";
```

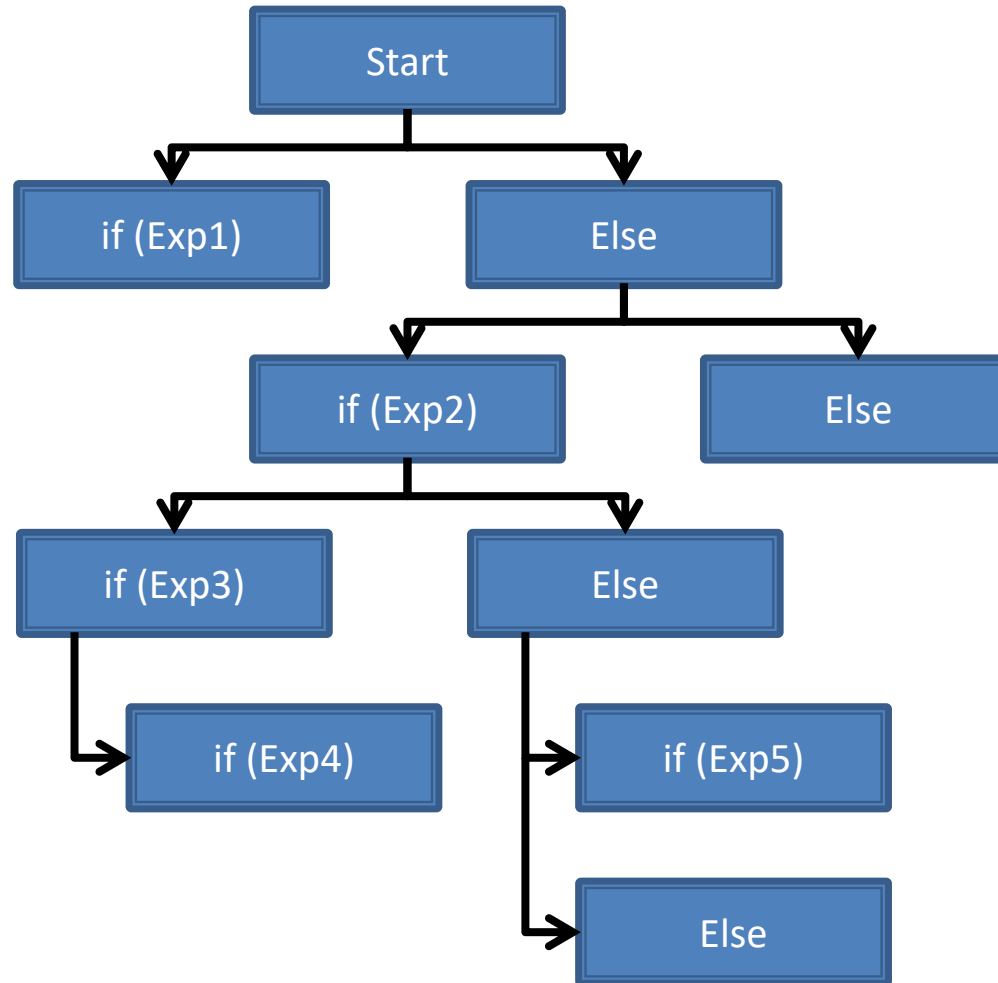


Points to Grade Conversion (Optimized)

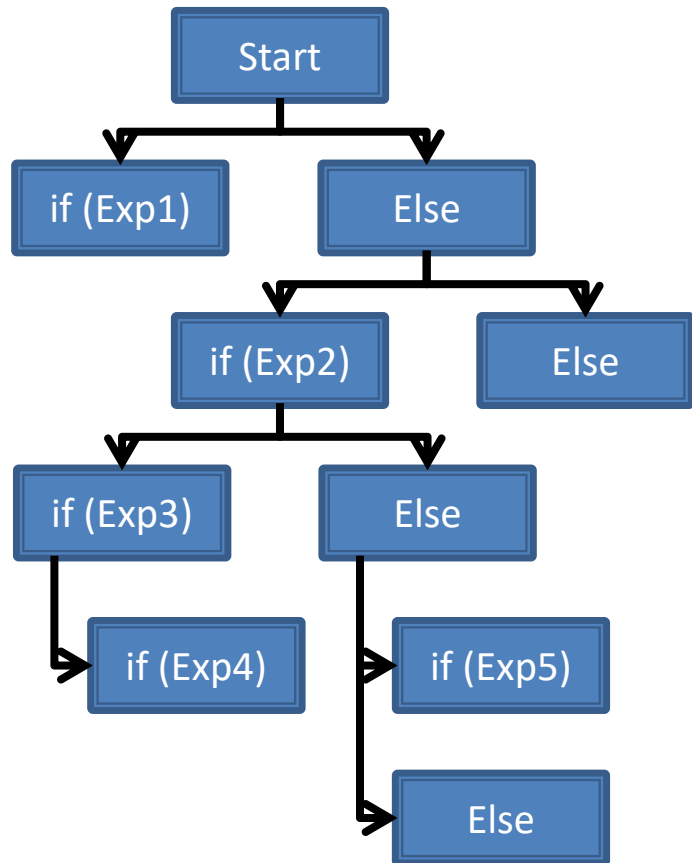
```
if (points >= 1000)
    grade = "A+";
else if (points >= 950)
    grade = "A";
else if (points >= 900)
    grade = "A-";
else if (points >= 870)
    grade = "B+";
else if (points >= 830)
    grade = "B";
else if (points >= 800)
    grade = "B-";
```



Deep Nested



Deep Nested – Safest Pairing



```
// Start
if (Exp1) {
    Statement1;
} else {
    if (Exp2) {
        if (Exp3) {
            if (Exp4) {
                Statement4;
            }
        } else {
            if (Exp5) {
                Statement5;
            } else {
                Statement6;
            }
        }
    } else {
        Statement7;
    }
}
```