Key point: *Forgetting necessary braces, ending an* **if** *statement in the wrong place, mistaking* **==** *for* **=**, *and dangling* **else** *clauses are common errors in selection statements. Duplicated statements in* **if-else** *statements and testing equality of double values are common pitfalls.*

Common Error 1: Forgetting Necessary Braces

```
if (radius >= 0)
    area = radius * radius * PI;
    System.out.println("The area "
        + " is " + area);
```

(a) Wrong

```
if (radius >= 0) {
    area = radius * radius * PI;
    System.out.println("The area "
        + " is " + area);
}
```

(b) Correct

```
if (radius >= 0)
    area = radius * radius * PI;

System.out.println("The area "
    + " is " + area);
```

Equivalent to (a)

Common Error 2: Wrong Semicolon at the if Line

```
if (radius >= 0);
{
    area = radius * radius * PI;
    System.out.println("The area "
        + " is " + area);
}
```

(a)

```
if (radius >= 0) { };
{
    area = radius * radius * PI;
    System.out.println("The area "
        + " is " + area);
}
```

(b)

(a) and (b) are equivalent

Don't put a semicolon, terminating the statement after the if-test.

Common Error 3: Redundant Testing of Boolean Values

```
if (even == true)
    System.out.println("It is even.");
```

(a)

```
if (even)
    System.out.println("It is even.");
```

(b)

(a) and (b) are equivalent

It is better NOT to compare Boolean values against the Boolean constants **true** and **false**.

Common Error 4: Dangling else Ambiguity

```
int i = 1, j = 2, k = 3;

if (i > j)
    if (i > k)
        System.out.println("A");
else
        System.out.println("B");
```

(a)

```
int i = 1, j = 2, k = 3;

if (i > j)
    if (i > k)
        System.out.println("A");
    else
        System.out.println("B");
```

(b)

Since **(i > j)** is false, nothing is displayed from the statements in (a) and (b). To force the **else** clause to match the first **if** clause, you must add a pair of braces:

```
int i = 1, j = 2, k = 3;

if (i > j) {
    if (i > k)
        System.out.println("A");
} else
    System.out.println("B");
```

This statement displays **B**.

Common Error 5: Equality Test of Two Floating-Point Values

```
double x = 1.0 – 0.1 – 0.1 – 0.1 – 0.1 – 0.1;
System.out.println(x == 0.5);
```

Here, **x** is not exactly 0.5, but **0.5000000000000001**. You cannot reliably test equality of two floating-point values.

```
final double EPSILON = 1E-14;
double x = 1.0 – 0.1 – 0.1 – 0.1 – 0.1 – 0.1;
if (Math.abs(x – 0.5) < EPSILON)
    System.out.println(x + " is approximately 0.5");
```

will display

```
0.5000000000000001 is approximately 0.5
```

The **Math.abs(a)** method can be used to return the absolute value of **a**.

Common Pitfall 1: Simplifying Boolean Variable Assignment

`if (number % 2 == 0)`
`  even = true;`
`else`
`  even = false;`
	`boolean even = number % 2 == 0;`

(a) Works	(b) Better

Common Pitfall 2: Avoiding Duplicate Code in Different Cases

```
if (instate) {
    tuition = 5000;
    System.out.println("The tuition is "  + tuition);
} else {
    tuition = 15000;
    System.out.println("The tuition is "  + tuition);
}
```

The foregoing is not an error, but it should be better written as follows.

```
if (instate) {
    tuition = 5000;
} else {
    tuition = 15000;
}
System.out.println("The tuition is "  + tuition);
```