Method Concepts

Understanding Java Methods

CST231 - Introduction to Programming

What is a Method?

A method is a reusable block of code that performs a specific task.

Purpose:

- Breaks complex problems into smaller, manageable pieces
- Allows code to be reused without rewriting it
- Makes programs easier to read, test, and debug
- Organizes code by grouping related actions together

Java Provides Built-In Methods

System.out (printing):

```
println()
print()
```

Scanner (input):

```
nextInt()
nextLine()
next()
```

Math operations:

```
abs()
pow()
sqrt()
```

String operations:

```
length()
equals()
```

Two Required Parts

1. Method Definition (Declaration)

```
public static int addNumbers(int a, int b) {
    return a + b;
}
```

2. Method Invocation (Call)

```
int result = addNumbers(5, 3);
```

Method Signature

A method is uniquely identified by its **signature**:

- Method name
- Number of parameters
- Type of each parameter (in order)

Note: Return type is NOT part of the signature

```
printSquare(int)                // Signature
addNumbers(int, int)            // Signature
addNumbers(double, double)      // Different signature!
```

The return Keyword

Non-void methods MUST have a return statement

✓ Must Return

```
public static int getNumber() {
    return 42;
}
```

No Return Needed

```
public static void print() {
    System.out.println("Hi");
}
```

Method Communication

Critical question: Does your method communicate with the program, the user, or both?

With the PROGRAM:

- Use parameters to receive data
- Use return to send data back

With the USER:

- Use System.out.println() to display
- Use Scanner to get input

This determines: void vs return type, Scanner parameter, println statements

Planning a Method

Before writing, answer these questions:

- **What is the method's name?** (describes what it does)
- **What data does it need?** (parameters and types)
- **What does it do with that data?** (body logic)
- **Does it send data back?** (return type or void)
- **Does it communicate with the user?** (print/Scanner)

Key Takeaways

- Methods = reusable code blocks
- Two parts: definition + invocation
- Signature = name + parameter types
- Non-void methods MUST return
- Plan before you write