AL GHURAIR UNIVERSITY
College of Computing

CSC 209 JAVA I

week 2- Arithmetic and Decision Making: Equality and Relational Operators

Objectives:

- **To use arithmetic operators.**
- **The** precedence **of arithmetic operators.**
- **To write decision-making statements.**
- **To use relational and equality operators**

Examples:

Example 1

Write and execute complete java program which print the result of the following algebra equations:

$$y = \frac{a + b + c}{X}$$

$$y = a + b + \frac{c}{X}$$

$$y = a * x * x + b * x + c$$

Text-printing program.

```
public class Welcome1 {

  // main method begins execution of Java application
  public static void main( String args[] )
  {

    int a, b, c, X;
    double  y;

  System.out.print( "\nPlease Enter value of the variable (a) " );

    // write your code to enter the value to the variable a.

  System.out.print( "\nPlease Enter value of the variable (b) " );

    // write your code to enter the value to the variable b.

  System.out.print( "\nPlease Enter value of the variable (c) " );
```

```
    // write your code to enter the value to the variable c.

  System.out.print( "Please Enter value of the variable (X) " );

    // write your code to enter the value to the variable X.


  y= (a + b + c ) / X ;
  System.out.println("The output of the first equation is: " + y);

  y=  a + b + c / X;
  System.out.println("The output of the second equation is: " + y);

  y= a * X * X + b * X + c;
  System.out.println("The output of the third equation is: " + y);

  y= a + x * x + b * x / c;
  System.out.println("The output of the third equation is: " + y);


  } // end method main

} // end class Welcome1
```

Example 2

The application of Fig. 2.15 uses six `if` statements to compare two integers input by the user. If the condition in any of these `if` statements is true, the assignment statement associated with that `if` statement executes. The program uses a `Scanner` to input the two integers from the user and store them in variables `number1` and `number2`. Then the program compares the numbers and displays the results of the comparisons that are true.

Figure 2.15. Equality and relational operators.

```
1  // Comparison.java
2  // Compare integers using if statements, relational operators
3  // and equality operators.
4  import java.util.Scanner; // program uses class Scanner
5
6  public class Comparison
7  {
8     // main method begins execution of Java application
9     public static void main( String args[] )
10     {
11        // create Scanner to obtain input from command window
12        Scanner input = new Scanner( System.in );
13
14        int number1; // first number to compare
15        int number2; // second number to compare
16
17        System.out.print( "Enter first integer: " ); // prompt
18        number1 = input.nextInt(); // read first number from user
```

```
19
20          System.out.print( "Enter second integer: " ); // prompt
21          number2 = input.nextInt(); // read second number from user
22
23          if ( number1 == number2 )
24             System.out.printf( "%d == %d\n", number1, number2 );
25
26          if ( number1 != number2 )
27             System.out.printf( "%d != %d\n", number1, number2 );
28
29          if ( number1 < number2 )
30             System.out.printf( "%d < %d\n", number1, number2 );
31
32          if ( number1 > number2 )
33             System.out.printf( "%d > %d\n", number1, number2 );
34
35          if ( number1 <= number2 )
36             System.out.printf( "%d <= %d\n", number1, number2 );
37
38          if ( number1 >= number2 )
39             System.out.printf( "%d >= %d\n", number1, number2 );
40
41       } // end method main
42
43    } // end class Comparison
```

```
Enter first integer: 777
Enter second integer: 777
777 == 777
777 <= 777
777 >= 777
```

```
Enter first integer: 1000
Enter second integer: 2000
1000 != 2000
1000 < 2000
1000 <= 2000
```

```
Enter first integer: 2000
Enter second integer: 1000
2000 != 1000
2000 > 1000
2000 >= 1000
```

The declaration of class `Comparison` begins at line 6

```
public class Comparison
```

The class's `main` method (lines 9 to 41) begins the execution of the program.

Line 12

```
Scanner input = new Scanner( System.in );
```

declares `Scanner` variable `input` and assigns it a `Scanner` that inputs data from the standard input (i.e., the keyboard).

Lines 14,15

```
int number1; // first number to compare
int number2; // second number to compare
```

declare the `int` variables used to store the values input from the user.

Lines 17,18

```
System.out.print( "Enter first integer: " ); // prompt
number1 = input.nextInt(); // read first number from user
```

prompt the user to enter the first integer and input the value, respectively. The input value is stored in variable `number1`.

Lines 20,21

```
System.out.print( "Enter second integer: " ); // prompt
number2 = input.nextInt(); // read second number from user
```

prompt the user to enter the second integer and input the value, respectively. The input value is stored in variable `number2`.

Lines 23,24

```
if ( number1 == number2 )
   System.out.printf( "%d == %d\n", number1, number2 );
```

declare an `if` statement that compares the values of the variables `number1` and `number2` to determine whether they are equal. An `if` statement always begins with keyword `if`, followed by a condition in parentheses. An `if` statement expects one statement in its body. The indentation of the body statement shown here is not required, but it improves the program's readability by emphasizing that the statement in line 24 is part of the `if` statement that begins on line 23. Line 24 executes only if the numbers stored in variables `number1` and `number2` are equal (i.e., the condition is true). The `if` statements at lines 26 27, 29 30, 32 33, 3536 and 38 39 compare `number1` and `number2` with the operators `!=`, `<`, `>`, `<=` and `>=`, respectively. If the condition in any of the `if` statements is true, the corresponding body statement executes.

Explain the order in which the operators are applied for the following equations:

$$y = ax^2 + bx + c$$

$$y = pr\%q + \frac{w}{x} - y$$

$$y = \frac{a + b + c}{x}$$

$$y = {}^{a}/_{x} + b + {}^{c}/_{x}$$

Ex

```
Step 1.   y = 2 * 5 * 5 + 3 * 5 + 7;      (Leftmost multiplication)
          2 * 5 is 10
Step 2.   y = 10 * 5 + 3 * 5 + 7;         (Leftmost multiplication)
          10 * 5 is 50
Step 3.   y = 50 + 3 * 5 + 7;             (Multiplication before addition)
          3 * 5 is 15
Step 4.   y = 50 + 15 + 7;                (Leftmost addition)
          50 + 15 is 65
Step 5.   y = 65 + 7;                     (Last addition)
          65 + 7 is 72
Step 6.   y = 72                          (Last operation—place 72 in y)
```