BIRZEIT UNIVERSITY

Selections

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Comparison Operators

Java Operator	Mathematics Symbol	Name	Example (radius is 5)	Result
<	<	less than	radius < 0	false
<=	≤	less than or equal to	radius <= 0	false
>	>	greater than	radius > 0	true
>=	≥	greater than or equal to	radius >= 0	true
==	=	equal to	radius == 0	false
!=	≠	not equal to	radius != 0	true

if-else

```
if (radius >= 0) {
   area = radius * radius * 3.14159;
   System.out.println("The area for the " +
   "circle of radius " + radius +  " is " + area);
}
else {
   System.out.println("Negative input");
}
```

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Common Errors

❖ Adding a **semicolon** at the end of an **if** clause is a common mistake.

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

Wrong

❖ This mistake is hard to find, because it is not a compilation error or a runtime error, it is a **logic** error.

❖ This error often occurs when you use the next-line block style.

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Logical Operators

Operator	Name
!	not
&&	and
||	or
^	exclusive or

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switch Statements

```
switch (status) {
      case 0:  compute taxes for single filers;
               break;
      case 1:  compute taxes for married file jointly;
               break;
      case 2:  compute taxes for married file separately;
               break;
      case 3:  compute taxes for head of household;
               break;
      default: System.out.println("Errors: invalid status");
               System.exit(1);
}
```

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Problem: Chinese Zodiac

Write a program that prompts the user to enter a year and displays the animal for the year.

year % 12 =
0: monkey
1: rooster
2: dog
3: pig
4: rat
5: ox
6: tiger
7: rabbit
8: dragon
9: snake
10: horse
11: sheep

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Conditional Operator

```
if (x > 0)
   y = 1;
else
   y = -1;
```

❖ is equivalent to:

```
y = (x > 0) ? 1 : -1;
```

(boolean-expression) **?** expression1 **:** expression2

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Conditional Operator

```
if (num % 2 == 0)
    System.out.println(num + "is even");
else
    System.out.println(num + "is odd");
```

```
System.out.println(  (num % 2 == 0)  ?
      num + "is even" :   num + "is odd");
```

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Formatting Output

❖ Use the **printf** statement:

```
System.out.printf( format, items );
```

- Where format is a string that may consist of substrings and **format specifiers**.
- A format specifier specifies how an item should be displayed.
- An item may be a numeric value, character, boolean value, or a string.
- Each specifier begins with a **percent** sign.

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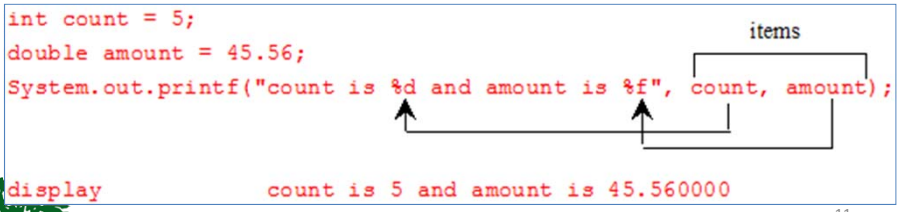
Frequently-Used Specifiers

Specifier	Output	Example
%b	a boolean value	true or false
%c	a character	'a'
%d	a decimal integer	200
%f	a floating-point number	45.460000
%e	a number in standard scientific notation	4.556000e+01
%s	a string	"Java is cool"

```
int count = 5;
double amount = 45.56;
System.out.printf("count is %d and amount is %f", count, amount);

display          count is 5 and amount is 45.560000
```



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Operator Precedence

- var++, var--
- +, - (Unary plus and minus), ++var,--var
- (type) Casting
- ! (Not)
- *, /, % (Multiplication, division, and remainder)
- +, - (Binary addition and subtraction)
- <, <=, >, >= (Comparison)
- ==, !=; (Equality)
- ^ (Exclusive OR)
- && (Conditional AND) Short-circuit AND
- || (Conditional OR) Short-circuit OR
- =, +=, -=, *=, /=, %= (Assignment operator)

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Operator Precedence and Associativity

❖ The expression in the parentheses is evaluated first. (Parentheses can be nested, in which case the expression in the inner parentheses is executed first.)

❖ When evaluating an expression without parentheses, the operators are applied according to the precedence rule and the **associativity rule**.

❖ If operators with the same precedence are next to each other, their associativity determines the order of evaluation. All binary operators except assignment operators are **left-associative**.

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Operator Associativity

❖ When two operators with the same precedence are evaluated, the *associativity* of the operators determines the order of evaluation.

❖ All binary operators except assignment operators are ***left-associative***.

a – b + c – d is equivalent to **((a – b) + c) – d**

❖ Assignment operators are ***right-associative***. Therefore, the expression

a = b += c = 5 is equivalent to **a = (b += (c = 5))**

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