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CS101/SEC.-2 CLASS NOTES¹

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if Single-Selection Statement

The conditional statement in Java has the form

if (condition) statement

The condition must be surrounded by parentheses.

In Java, as in most programming languages, you will often want to execute multiple statements when a single condition is true. In this case, you use a block statement that takes the form

```
{
statement<sub>1</sub>
statement<sub>2</sub>
. . .
```

Programs use selection statements to choose among alternative courses of action. For example, suppose that the passing grade on an exam is 60. The pseudocode statement

If student's grade is greater than or equal to 60 Print "Passed"

determines whether the condition "student's grade is greater than or equal to 60" is true or false. If the condition is true, "Passed" is printed, and the next pseudocode statement in order is "performed." (Remember that pseudocode is not a real programming language.) If the condition is false, the Print statement is ignored, and the next pseudocode statement in order is performed. The indentation of the second line of this selection statement is optional, but recommended, because it emphasizes the inherent structure of structured programs.

The preceding pseudocode If statement may be written in Java as

if (studentGrade >= 60)
 System.out.println("Passed");

¹ Does not reflect the actual class coverage.

if...else Double-Selection Statement

The if single-selection statement performs an indicated action only when the condition is true; otherwise, the action is skipped. The if...else double-selection statement allows the programmer to specify an action to perform when the condition is true and a different action when the condition is false. For example, the pseudocode statement

If student's grade is greater than or equal to 60 Print "Passed" Else Print "Failed"

prints "Passed" if the student's grade is greater than or equal to 60, but prints "Failed" if it is less than 60. In either case, after printing occurs, the next pseudocode statement in sequence is "performed."

The preceding If...Else pseudocode statement can be written in Java as

```
if ( grade >= 60 )
   System.out.println( "Passed" );
else
   System.out.println( "Failed" );
```

Note that the body of the else is also indented. Whatever indentation convention you choose should be applied consistently throughout your programs. It is difficult to read programs that do not obey uniform spacing conventions.

Nested if...else Statements

A program can test multiple cases by placing if...else statements inside other if...else statements to create **nested if...else statements**. For example, the following pseudocode represents a nested if...else that prints A for exam grades greater than or equal to 90, B for grades in the range 80 to 89, C for grades in the range 70 to 79, D for grades in the range 60 to 69 and F for all other grades:

```
If student's grade is greater than or equal to 90
Print "A"
else
If student's grade is greater than or equal to 80
Print "B"
else
If student's grade is greater than or equal to 70
Print "C"
else
```

```
If student's grade is greater than or equal to 60
Print "D"
else
Print "F"
```

This pseudocode may be written in Java as

```
if ( studentGrade >= 90 )
   System.out.println( "A" );
else
   if ( studentGrade >= 80 )
      System.out.println( "B" );
   else
      if ( studentGrade >= 70 )
      System.out.println( "C" );
   else
      if ( studentGrade >= 60 )
      System.out.println( "D" );
   else
      System.out.println( "F" );
```

Conditional Operator (?:)

Java provides the conditional operator (?:) that can be used in place of an if...else statement. This is Java's only **ternary operator**this means that it takes three operands. Together, the operands and the ?: symbol form a **conditional expression**. The first operand (to the left of the ?) is a **boolean** expression (i.e., a condition that evaluates to a boolean valuetrue or **false**), the second operand (between the ? and :) is the value of the conditional expression if the boolean expression is TRue and the third operand (to the right of the :) is the value of the conditional expression if the boolean expression evaluates to false. For example, the statement

```
System.out.println( studentGrade >= 60 ? "Passed" : "Failed" );
```

prints the value of println's conditional-expression argument. The conditional expression in this statement evaluates to the string "Passed" if the boolean expression studentGrade >= 60 is true and evaluates to the string "Failed" if the boolean expression is false. Thus, this statement with the conditional operator performs essentially the same function as the if...else statement shown earlier in this section. The precedence of the conditional operator is low, so the entire conditional expression is normally placed in parentheses.

QUESTIONS

1- The ______ statement is used to execute one action when a condition is true and another when that condition is false.

```
2- if ( gender == 1 )
System.out.println( "Woman" );
else;
```

System.out.println("Man");

3- Determine the output for each of the given sets of code when x is 9 and y is 11.

```
if (x < 10)
a-
      if (y > 10)
      System.out.println( "*****" );
      else
      System.out.println( "######" );
      System.out.println( "$$$$$" );
b-
      if (x < 10)
      {
      if (y > 10)
      System.out.println( "*****" );
      }
      else
      {
      System.out.println( "######" );
      System.out.println( "$$$$" );
      }
```

4- Modify the given code to produce the output shown in each part of the problem. Use proper indentation techniques. Make no changes other than inserting braces and changing the indentation of the code.

```
if ( y == 8 )
if ( x == 5 )
System.out.println( "@@@@@@" );
else
System.out.println( "#####" );
System.out.println( "$$$$$" );
System.out.println( "&&&&&" );
```

a. Assuming that x = 5 and y = 8, the following output is produced:

```
@@@@@@
```

b. Assuming that x = 5 and y = 8, the following output is produced:

```
@@@@@
&&&&&&
```

c- Assuming that x = 5 and y = 8, the following output is produced:

@@@@@ \$\$\$\$\$ &&&&&

5- Write equal of this conditional operator statemement.(?:)

System.out.println(studentGrade >= 60 ? "Passed" : "Failed");

SOLUTIONS

1- if-else

2- There will no (;) after else.

```
b- ****
3- a- ****
       $$$$$
      a- if (y == 8)
           {
           if (x = 5)
           System.out.println( "@@@@@");
           }
           else
           ł
           System.out.println( "######" );
           System.out.println( "$$$$$" );
           System.out.println( "&&&&&" );
           ļ
      b- if (y == 8)
          {
          if (x = 5)
          System.out.println( "@@@@@");
          }
          else
          Ł
          System.out.println( "######" );
          System.out.println( "$$$$$" );
          }
          System.out.println( "&&&&&" );
       c-if(y == 8)
             if (x = 5)
              System.out.println( "@@@@@");
             else
              System.out.println( "#####" );
              System.out.println( "$$$$$" );
              System.out.println( "&&&&&" );
5-
         if( studentGrade>=60)
```

System.out.println("Passed");

else

System.out.println("Failed");