Conditional Statements

Programming in Java

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6- Nested if statements: Exercise: Leap year

- **Problem:**
  - Leap years occur in years exactly divisible by four, except that years ending in 00 are leap years only if they are divisible by 400.
- **Example:**
  - 1700, 1800, 1900, 2100, and 2200 are not leap years
  - 1600, 2000, and 2400 are leap years.
- **Algorithm:**
  - if year is a multiple of 400 ----> leap
  - otherwise
    - if year is a multiple of 100 ----> not leap
    - otherwise
      - if year is a multiple of 4 ----> leap
      - otherwise ----> not leap

7- The **switch** statement

- Remember: Java conditional statements are
  - the **if** statement
  - the **if-else** statement
  - the **switch** statement
- The **switch**:
  - replaces a series of **if-else-if-else-if-else…**
  - like a multiple choice question
  - that tests the **equality** of an expression
  - the expression must evaluate to a char, int, short, or byte

7- The **switch** statement: Example 1: Using nested if statements

```
char romanNumeral;
int decValue;
if (romanNumeral ==  'I')
        decValue = 1;
else if (romanNumeral == 'V')
   decValue = 5;
else if (romanNumeral == 'X')
        decValue = 10;
else if (romanNumeral == 'L')
   decValue = 50;
else if (romanNumeral ==  'C')
   decValue = 100;
else
   System.out.println( "Not a Roman numeral <= 100");
```

Switch statement provides a cleaner way to do multiway selection than the more general nested if.

7- The **switch** statement: Example 1: Using switch

```
char romanNumeral;  int decValue;
switch(romanNumeral)
{
   case 'I': decValue = 1;
             break;
   case 'V': decValue = 5;
             break;
   case 'X': decValue = 10;
             break;
   case 'L': decValue = 50;
             break;
   case 'C': decValue = 100;
             break;
   default:  System.out.println( "Not a Roman numeral<= 100
   “);
}
```

7- The **switch** statement

- syntax:

switch,
case,
break,
default
are reserved
words

break and
default
case
are optional

```
switch ( expression )
{
   case value1 :
      statement-list1
      break;
   case value2 :
         statement-list2
      break;
   case value3 :
         statement-list3
      break;
   case  ...
   default:
     default-statement-list
}
```

If expression
matches value2,
control jumps
to here

7- The **switch** statement

- **break**
  - – Often used as the last statement in each case
  - – **break** causes control to transfer to the end of the **switch**
  - – If a **break** is not used, the flow of control will continue into the next case
- **default** case
  - – A **switch** can have an optional **default** case
  - – If the **default** case is present, control will transfer to it if no other case value matches
  - – the default case can be positioned anywhere in the switch, but usually it is placed at the end

7- The **switch** statement: Logic of the switch

1. The expression is evaluated

2. Its value is compared to the various cases

3. If an equality is found, the corresponding statements are executed until a **break** or until the end of the switch

4. If no equality is found, the default statements are executed if a default case is there.

7- The **switch** statement: Example

```
int grade, category;
System.out.print("Enter a grade (0 to 100):");
grade = keyboard.nextInt();
category = grade / 10;
switch (category)  {
   case 10:  case 9:
      System.out.println ("excellent.");
      break;
   case 8:
      System.out.println ("nice job.");
      break;
   case 7:
     System.out.println ("average.");
     break;
   case 6:
     System.out.println ("below average.");
     break;
   default:
     System.out.println ("problem.");
    }
```

If user enters 100?

Output

7- The **switch** statement: Example

```
int grade, category;
System.out.print("Enter a grade (0 to 100):");

grade = keyboard.nextInt();
category = grade / 10;

switch (category)  {

   case 10:  case 9:
      System.out.println ("excellent.");
      break;

   case 8:
      System.out.println ("nice job.");
      break;

   case 7:
      System.out.println ("average.");
      break;

   case 6:
      System.out.println ("below average.");
      break;

   default:
      System.out.println ("problem.");
    }
```

If user enters 94?

A. excellent

B. excellent
nice job

C. excellent
nice job
average

D. excellent
nice job
average
below average

E. None of the above choices

Output

7- The **switch** statement: Example

```
int grade, category;
System.out.print("Enter a grade (0 to 100):");

grade = keyboard.nextInt();
category = grade / 10;

switch (category)  {

   case 10:  case 9:
      System.out.println ("excellent.");
      break;

   case 8:
      System.out.println ("nice job.");
      break;

   case 7:
      System.out.println ("average.");
      break;

   case 6:
      System.out.println ("below average.");
      break;

   default:
      System.out.println ("problem.");
    }
```

If user enters 57?

A. excellent

B. excellent
nice job

C. excellent
nice job
average

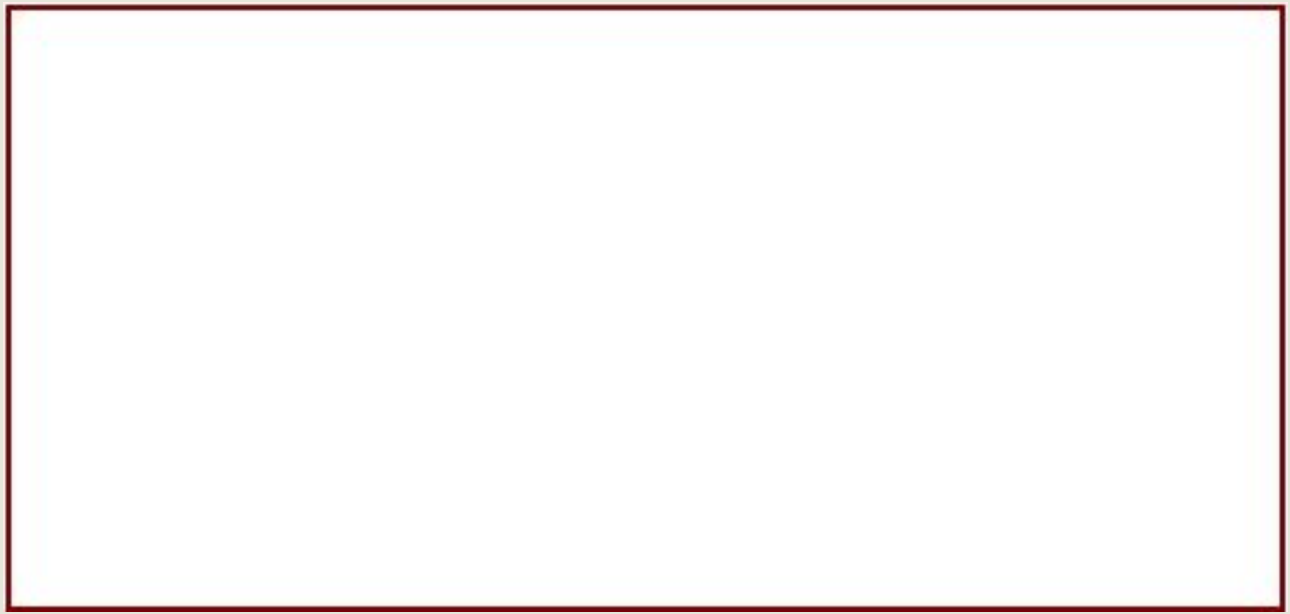
D. excellent
nice job
average
below average

E. None of the above choices

Output

7- The **switch** statement: Exercise

- Transform the previous switch into a **if-else** statement



7- The **switch** statement: Exercises

- Try to do the **if** and **if-else** statement exercises we have done with **switch** if possible.

8- The conditional operator

- Shortcut to an **if** in some cases
- ternary operator (needs 3 operands)
- Syntax: **condition ? expression1 : expression2**
- Semantics:
  – if the **condition** is true, **expression1** is evaluated;
  – if it is false, **expression2** is evaluated
  – the result of the chosen expression is the result of the entire conditional operator

8- The conditional operator: Example

```
larger = ((num1 > num2) ? num1 : num2);
System.out.println(larger);
```

If num1 is 10 and num2 is 20 ?

If num1 is 20 and num2 is 10 ?

Output

8- The conditional operator: Example

```
System.out.println("Change is " + count +((count==1) ?
        " Dime": " Dimes"));
```

If count is 1?

If count is not 1?

Output

8- The conditional operator: Exercises

- Try to do the **if** and **if-else** statement exercises we have done with **conditional operator** if possible.