Exercises for Lecture 3
Chapter 2 Expressions
Chapter 3 Selections

COMP217
Java Programming
Spring 2019

Instructor: Gil-Jin Jang

Ex 3-1

Exercise 3-1: Metropolitan City

- Write the following code in Java and C
  - Java code is already given

- A city can be classified as a metropolitan city if it satisfies at least one of the following 2 conditions:
  - It is a capital of a country, and the population is larger than or equal to one million.
  - Number of people whose annual income is at least 100 million is more than or equal to 0.5 million.

Ex 3-1

Java Code for the exercise

Submission:
Metropolis.java
Metropolis.c

```java
/**
 * Check if a city is a metropolitan city
 */
import java.util.Scanner;       // Built-in Scanner class

public class Metropolis {
  public static void main (String args[] ) {
    boolean isCapital, isMetropolis;
    int citizen;
    int bourgeois;

    Scanner sc = new Scanner(System.in);
    System.out.print("It the city a capital? (capital:1 non-capital:0) ");
    isCapital = (sc.nextInt() == 1);
    System.out.print("Population? (in thousands) ");
    citizen = sc.nextInt();
    System.out.print("Bourgeois? (in thousands) ");
    bourgeois = sc.nextInt();

    isMetropolis = (isCapital && citizen >= 1000)
      || (bourgeois >= 500);

    System.out.println("Metropolis: " + isMetropolis);
  }
}
```

```
/* execution example
$ javac Metropolis.java
$ java Metropolis
It the city a capital? (capital:1 non-capi
Population? (in thousands) 2000
Bourgeois? (in thousands) 1000
Metropolis: true
$ java Metropolis
It the city a capital? (capital:1 non-capi
Population? (in thousands) 1000
Bourgeois? (in thousands) 500
Metropolis: true
*/
```

Ex 3-2: equals Example

```
public class Ex32_equals {
  public static void main ( String[] args ) {
    String string1 = "aardvarks";
    boolean comp1, comp2, comp3, comp3b, comp4; // equals result is a boolean

    comp1 = string1.equals( "boa constrictors" );
    // false: Unicode for 'a' and 'b' are 97 and 98
    comp2 = string1.equals( "aardvarks" );
    // true: exactly the same
    comp3 = string1.equals( "Aardvarks" );
    // false: case sensitive
    comp3b = string1.equalsIgnoreCase( "Aardvarks" );
    // true: ignore case differences
    comp4 = string1.equals( "aardvarks are cooler" );
    // false: numbers of characters mismatch

    System.out.println(
        comp1 + " " + comp2 + " " + comp3 + " " + comp3b + " " + comp4);
    // false true false true false
  }
}
"Ex32_equals.java" 21L, 756C written                    21,2          All
```

Submission:
Ex32_equals.java
Ex32_equals.c

- The output of the C code should be “true” and “false” only
- Hint: use “strcmp”
- For equalsIgnoreCase, https://stackoverflow.com/questions/5820810/case-insensitive-string-comp-in-c

Ex 3-3: ComparingNumbers.java

```
public class ComparingNumbers {
  public static void main ( String[] args ) {
    // declare and initialize variables
    byte   aByte  = 5;
    short  aShort = -9025;
    int    anInt  = 50000;
    //long   aLong  = 809230972398749342L;
    long   aLong  = 809230972398749L;
    float  aFloat = 5.0F;
    double aDouble = 3.1415926535897;
    char   char1 = 'A', char2 = 'B', char3 = 'a';

    // form logical expressions
    boolean longFloatComparison = (aLong == aFloat),
            byteIntComparison   = (aByte <= anInt),
            doubleShortComparison = (aDouble != aShort),
            charComparison1 = (char1 == char3),
            charComparison2 = (char3 < char2);

    boolean expr = 15 % 4 * 7 + 15 >= 1
      || 7 < 12 || !(-8 != 7 && 7 <= 10 && 5 > 7);

    // print results
    System.out.println("Compare long   & float: " + longFloatComparison);
    System.out.println("Compare byte   & int  : " + byteIntComparison);
    System.out.println("Compare double & short: " + doubleShortComparison);
    System.out.println("Compare char1  & char3: " + charComparison1);
    System.out.println("Compare char3  & char2: " + charComparison2);
    System.out.println("Value of long expression: " + expr);
  }     // end of main
}       // end of class definition
                                                    28,37         All
```

```
$ java ComparingNumbers
Compare long   & float: false
Compare byte   & int  : true
Compare double & short: true
Compare char1  & char3: false
Compare char3  & char2: false
Value of long expression: true
```

Submission:
ComparingNumbers.java
ComparingNumbers.c

- The output of the C code should be “true” or “false” only
- You may have to use “long long” for 64-bit integers in C

Ex 3-4: Tax.java

```java
import java.util.Scanner;

public class Tax {
  public static void main ( String[] args ) {
    int income, tax;
    Scanner input = new Scanner(System.in);

    System.out.print("Enter your income: ");
    income = input.nextInt();

    if ( income <= 1000 )
      tax = (int) (0.09 * income);
    else if ( income <= 4000 )  // income > 1000 && income <= 4000
      tax = (int) (0.18 * income);
    else if ( income < 8000 )   // income > 4000 && income < 8000
      tax = (int) (0.27 * income);
    else        // income >= 8000
      tax = (int) (0.36 * income);

    System.out.printf("Total tax is %d.\n",tax);
  }
}

/*
$ javac Tax.java
$ java Tax
Enter your income: 3000
Total tax is 540.
*/
```

Submission:
Tax.java
Tax.c

Ex 3-5: Leap Year

```java
import java.util.Scanner;

public class DaysInMonth {
  public static void main ( String[] args ) {
    int month;
    int year = 2009;
    int days = 0;
    Scanner scan = new Scanner(System.in);

    System.out.print("Enter your a number: ");
    month = scan.nextInt();

    switch ( month ) {
      case 1:  case 3:   case 5:  case 7:
      case 8:  case 10:  case 12:       // "or"
        days = 31;
        break;
      case 4:  case 6:   case 9:  case 11:
        days = 30;
        break;
      case 2:
        if ( ((year%4 == 0) && (year%100 != 0)) || (year%400 == 0) )
          // leap year
          days = 29;
        else
          days = 28;
        break;
      default:
        days = 0;
        System.out.println("Wrong month number");
    }
    System.out.println("Number of days in month " + month + " is " + days);
  }
}
```

Submission:
DaysInMonth.java
DaysInMonth.c