Consider the following problems, design the algorithms that would solve them, and then implement the algorithm in Java.

You are free to choose between writing pseudo-code or drawing flowcharts. Submit your algorithm, either as a flowchart or pseudo-code, the source code. Make sure to include snapshots of running program. You can take snapshots using PrintScreen of the console window in which you run the program. Put your algorithm and the snapshots together in a file and submit the file using the link found at the bottom of the screen, *Unit 4: Programs.*

**Assignment Problem 1:**  
Write a program that reads the ages of three persons from the user, and decides who is the oldest, and who the youngest person is.

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| **import** java.util.Scanner;  /\*  Name: Casey Carnnia  Date: 10.09.2012  Scope: Write a program that reads the ages of three persons from the user,  and decides who is the oldest, and who the youngest person is.  Solution: welcome the user  prompt for input of 3 numbers for 3 ages  store the input in num1, num2, num3 type = int  declare variables minAnswer and maxAnswer type = int  if num1 > num2 && num1 > num3 => maxAnswer = num1  if num2 > num1 && num2 > num3 => maxAnswer = num2  if num3 > num1 && num3 > num2 => maxAnswer = num3    if num1 < num2 && num1 < num3 => minAnswer = num1  if num2 < num1 && num2 < num3 => minAnswer = num2  if num3 < num2 && num3 < num1 => minAnswer = num3    output youngest person is minAnswer and the oldest one is maxAnswer    \*/    // declare class  **public** **class** olderYounger{  //declare the main method  **public** **static** **void** main(String[] args) {    // welcome the user  System.*out*.println("I can tell you out of the 3 people's ages you enter who is younger and who is older.");  // get ready to read the user data  Scanner keyboard = **new** Scanner(System.*in*);  // prompt the user for a letter  // store the user input  System.*out*.print("Please enter a number to represent the first person's age: ");  **int** num1 = keyboard.nextInt();  System.*out*.print("Please enter a number to represent the second person's age: ");  **int** num2 = keyboard.nextInt();  System.*out*.print("Please enter a number to represent the third person's age: ");  **int** num3 = keyboard.nextInt();  //declare maxAnswer and minAnswer  **int** maxAnswer = 0;  **int** minAnswer = 0;    **if** (num1 > num2 && num1 > num3) { maxAnswer = num1; }  **if** (num2 > num1 && num2 > num3) { maxAnswer = num2; }  **if** (num3 > num1 && num3 > num2) { maxAnswer = num3; }    **if** (num1 < num2 && num1 < num3) { minAnswer = num1; }  **if** (num2 < num1 && num2 < num3) { minAnswer = num2; }  **if** (num3 < num2 && num3 < num1) { minAnswer = num3; }    //output the answer  System.*out*.println("The youngest person's age is " + minAnswer + " and the oldest one is " + maxAnswer + " years old.");            }//main END  }//class END |
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**Assignment Problem 2:**  
Write a program that reads in the name and salary of an employee. Here the salary will denote an hourly wage, such as $9.25. Then ask how many hours the employee worked in the past week. Be sure to accept fractional hours. Compute the pay. Any overtime work (over 40 hours per week) is paid at 150 percent of the regular wage. Print a paycheck for the employee.

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| **import** java.util.Scanner;  /\*  Name: Casey Carnnia  Date: 10.09.2012  Scope: Write a program that reads in the name and salary of an employee.  Here the salary will denote an hourly wage, such as $9.25.  Then ask how many hours the employee worked in the past week.  Be sure to accept fractional hours. Compute the pay.  Any overtime work (over 40 hours per week) is paid at 150 percent of the regular wage.  Print a paycheck for the employee.  Solution: welcome the user  prompt for input of hourlyWage input type = double  prompt the user for hoursWorked input type = double  store the input in constants  declare variable payAmount type = double  declare variable otPayAmout type = double  declare variable totalPay type = double    if hoursWorked > 40 =>  payAmount = hourlyWage \* 40  otPayAmount = (hoursWorked - 40 ) \* (hourlyWage \* 1.5)  totalPay = payAmount + otPayAmount  else  totalPay = hourlyWage \* hoursWorked  output "Your paycheck amount for this week is " + totalPay    \*/    // declare class  **public** **class** weeklyPay{  //declare the main method  **public** **static** **void** main(String[] args) {    // welcome the user  System.*out*.println("I can calculate your weekly pay.");  // get ready to read the user data  Scanner keyboard = **new** Scanner(System.*in*);  // prompt the user for hourlyWage  // store the user input  System.*out*.print("Please enter your hourly wage, you can enter fractions too: ");  **final** **double** HOURLY\_WAGE = keyboard.nextDouble();    // prompt the user for hoursWorked  // store the user input  System.*out*.print("Please enter number hours you worked this week, you can enter fractions too: ");  **final** **double** HOURS\_WORKED = keyboard.nextDouble();    // declare variables and set to 0  **double** payAmount = 0;  **double** otPayAmount = 0;  **double** totalPay = 0;  // do the calculation  **if** (HOURS\_WORKED > 40){  payAmount = HOURS\_WORKED \* 40 ;  otPayAmount = (HOURS\_WORKED - 40 ) \* (HOURLY\_WAGE \* 1.5) ;  totalPay = payAmount + otPayAmount ;  }  **else**{  totalPay = HOURLY\_WAGE \* HOURS\_WORKED ;  }// if END    System.*out*.printf("You worked %5.2f hours and your normal rate of pay is $%4.2f ", HOURS\_WORKED, HOURLY\_WAGE );  System.*out*.printf("\nYour overtime pay is $%5.2f and your total paycheck is $%10.2f ", otPayAmount, totalPay );    }//main END  }//class END |
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**Assignment Problem 3:**  
The original US income tax of 1913 was quite simple. The tax was:

* 1 percent on the first $50,000
* 2 percent on the amount over $50,000 up to $75,000
* 3 percent on the amount over $75,000 up to $100,000
* 4 percent on the amount over $100,000 up to $250,000
* 5 percent on the amount over $250,000 up to $500,000
* 6 percent on the amount over $500,000.

There was no separate schedule for single or married taxpayers. Write a program that computes the income tax according to this schedule.

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| **import** java.util.Scanner;  /\*  Name: Casey Carnnia  Date: 10.10.2012  Scope: The original US income tax of 1913 was quite simple. The tax was:  • 1 percent on the first $50,000  • 2 percent on the amount over $50,000 up to $75,000  • 3 percent on the amount over $75,000 up to $100,000  • 4 percent on the amount over $100,000 up to $250,000  • 5 percent on the amount over $250,000 up to $500,000  • 6 percent on the amount over $500,000.  There was no separate schedule for single or married taxpayers.  Write a program that computes the income tax according to this schedule.  Solution: welcome the user  prompt for input of INCOME\_AMOUNT type = double  store the input in constants INCOME\_AMOUNT  declare variable taxAble1 taxAble2 taxAble3 taxAble4 taxAble5 taxAble6 type = double set to 0  declare variable taxItMore type = double set to 0  declare variable incomeTax type = double set to 0      if INCOME\_AMOUNT =< 50000 =>  taxAble1 = INCOME\_AMOUNT \* .01    else if INCOME\_AMOUNT > 50000 && INCOME\_AMOUNT >= 75000 =>  taxAble1 = 50000 \* .01  taxItMore = INCOME\_AMOUNT - 50000  taxAble2 = taxItMore \* .02    else if INCOME\_AMOUNT > 75000 && INCOME\_AMOUNT >= 100000 =>  taxAble1 = 50000 \* .01  taxAble2 = 25000 \* .02  taxItMore = INCOME\_AMOUNT - 75000  taxAble3 = taxItMore \* .03    else if INCOME\_AMOUNT > 100000 && INCOME\_AMOUNT >= 250000 =>  taxAble1 = 50000 \* .01  taxAble2 = 25000 \* .02  taxAble3 = 25000 \* .03  taxItMore = INCOME\_AMOUNT - 100000  taxAble4 = taxItMore \* .04    else if INCOME\_AMOUNT > 250000 && INCOME\_AMOUNT >= 500000 =>  taxAble1 = 50000 \* .01  taxAble2 = 25000 \* .02  taxAble3 = 25000 \* .03  taxAble4 = 150000 \* .04  taxItMore = INCOME\_AMOUNT - 150000  taxAble5 = taxItMore \* .05    else if INCOME\_AMOUNT > 500000 =>  taxAble1 = 50000 \* .01  taxAble2 = 25000 \* .02  taxAble3 = 25000 \* .03  taxAble4 = 150000 \* .04  taxAble5 = 250000 \* .05  taxItMore = INCOME\_AMOUNT - 250000  taxAble6 = taxItMore \* .06    incomeTax = taxAble1 + taxAble2 + taxAble3 + taxAble4 + taxAble5 + taxAble6  output: You said your income was INCOME\_AMOUNT so your tax is incomeTax        \*/    // declare class  **public** **class** taxMan{  //declare the main method  **public** **static** **void** main(String[] args) {    // welcome the user  System.*out*.println("I can calculate your taxes as if you lived in 1913.");  // get ready to read the user data  Scanner keyboard = **new** Scanner(System.*in*);  // prompt the user for INCOME\_AMOUNT  // store the user input  System.*out*.print("Please enter your income for: ");  **final** **double** INCOME\_AMOUNT = keyboard.nextDouble();        // declare variables and set to 0  **double** taxAble1 = 0;  **double** taxAble2 = 0;  **double** taxAble3 = 0;  **double** taxAble4 = 0;  **double** taxAble5 = 0;  **double** taxAble6 = 0;  **double** taxItMore = 0;  **double** incomeTax = 0;    // do the calculation  **if** (INCOME\_AMOUNT <= 50000){  taxAble1 = INCOME\_AMOUNT \* .01;  }  **else** **if** (INCOME\_AMOUNT > 50000 && INCOME\_AMOUNT <= 75000){  taxAble1 = 50000 \* .01;  taxItMore = INCOME\_AMOUNT - 50000;  taxAble2 = taxItMore \* .02;  }  **else** **if** (INCOME\_AMOUNT > 75000 && INCOME\_AMOUNT <= 100000){  taxAble1 = 50000 \* .01;  taxAble2 = 25000 \* .02;  taxItMore = INCOME\_AMOUNT - 75000;  taxAble3 = taxItMore \* .03;  }  **else** **if** (INCOME\_AMOUNT > 100000 && INCOME\_AMOUNT <= 250000){  taxAble1 = 50000 \* .01;  taxAble2 = 25000 \* .02;  taxAble3 = 25000 \* .03;  taxItMore = INCOME\_AMOUNT - 100000;  taxAble4 = taxItMore \* .04;  }  **else** **if** (INCOME\_AMOUNT > 250000 && INCOME\_AMOUNT <= 500000){  taxAble1 = 50000 \* .01;  taxAble2 = 25000 \* .02;  taxAble3 = 25000 \* .03;  taxAble4 = 150000 \* .04;  taxItMore = INCOME\_AMOUNT - 150000;  taxAble5 = taxItMore \* .05;  }  **else** **if** (INCOME\_AMOUNT > 500000){  taxAble1 = 50000 \* .01;  taxAble2 = 25000 \* .02;  taxAble3 = 25000 \* .03;  taxAble4 = 150000 \* .04;  taxAble5 = 250000 \* .05;  taxItMore = INCOME\_AMOUNT - 250000;  taxAble6 = taxItMore \* .06;  }//if END    incomeTax = taxAble1 + taxAble2 + taxAble3 + taxAble4 + taxAble5 + taxAble6;      System.*out*.printf("You said your income was $%10.2f ", INCOME\_AMOUNT );  System.*out*.printf("\nso your tax is $%5.2f ", incomeTax );    }//main END  }//class END |
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**Assignment Problem 4:**  
Write a program asks the user to enter a month (1 for January, 2 for February, and so on) and then prints the number of days in the month. For February, print "28 or 29 days".

For example:

Enter a mont: 5  
30 days

Do not use a separate if/else branch for each month. Use Boolean operators.

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| /\*  Name: Casey Carnnia  Date: 10.09.2012  Scope: Write a program that asks the user to enter a month  (1 for January, 2 for February, and so on) and then  prints the number of days in the month.  For February, print “28 or 29 days”.  Enter a month: 5  30 days  Do not use a separate if/else branch for each month. Use Boolean operators.  Algorithm: prompt the user for a month number between 1 and 12  capture the number in monthInput type = int  use a switch to evaluate the input  print out "monthInput has n number of days"  \*/  // import needed package  **import** java.util.Scanner;  // declare class  **public** **class** daysInMonth{  //declare the main method  **public** **static** **void** main(String[] args) {  // welcome the user  System.*out*.println("I can tell you how many days are in month.");  // get ready to read the user data  Scanner keyboard = **new** Scanner(System.*in*);  // prompt the user for a number for month  System.*out*.print("Please enter a number between 1 to 12 representing a month in the year: ");  // store the user input  **int** monthInput = keyboard.nextInt();  // implement the switch  **switch** (monthInput)  {  **case** 1:  System.*out*.println("You entered " + monthInput + " there are 31 days in Januaray. ");  **break**;  **case** 2:  System.*out*.println("You entered " + monthInput + " there are 28 days in Febuarary. ");  **break**;  **case** 3:  System.*out*.println("You entered " + monthInput + " there are 31 days in March. ");  **break**;  **case** 4:  System.*out*.println("You entered " + monthInput + " there are 30 days in April. ");  **break**;  **case** 5:  System.*out*.println("You entered " + monthInput + " there are 31 days in May. ");  **break**;  **case** 6:  System.*out*.println("You entered " + monthInput + " there are 30 days in June. ");  **break**;  **case** 7:  System.*out*.println("You entered " + monthInput + " there are 31 days in July. ");  **break**;  **case** 8:  System.*out*.println("You entered " + monthInput + " there are 31 days in Auguest. ");  **break**;  **case** 9:  System.*out*.println("You entered " + monthInput + " there are 30 days in September. ");  **break**;  **case** 10:  System.*out*.println("You entered " + monthInput + " there are 31 days in October. ");  **break**;  **case** 11:  System.*out*.println("You entered " + monthInput + " there are 30 days in November. ");  **break**;  **case** 12:  System.*out*.println("You entered " + monthInput + " there are 31 days in December. ");  **break**;  **default**:  System.*out*.println("You entered " + monthInput + " which is invalid. ");  **break**;  }// switch END          }//main END  }//class END |
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**Assignment Problem 5:**

A year with 366 days is called a leap year. Leap years are necessary to keep the calendar synchronized with the sun because the earth revolves around the sun once every 365.25 days. Actually, that figure is not entirely precise, and for all dates after 1582 the Gregorian corrections apply. Usually years that are divisible by 4 are leap years, for example 1996. However, years that are divisible by 100 (for example 1900) are not leap years, but years that are divisible by 400 are leap years (for example 2000). Write a program that asks the user for a year and computes whether that year is a leap year. Use a single if statement and Boolean operators.

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| **import** java.util.Scanner;  /\*  Name: Casey Carnnia  Date: 10.10.2012  Scope: A year with 366 days is called a leap year.  Leap years are necessary to keep the calendar synchronized with the sun  because the earth revolves around the sun once every 365.25 days.  Actually, that figure is not entirely precise, and for all dates after 1582 the Gregorian corrections apply.    Usually years that are divisible by 4 are leap years, for example 1996.    However, years that are divisible by 100 (for example 1900) are not leap years,  but years that are divisible by 400 are leap years (for example 2000).  Write a program that asks the user for a year and computes whether that year is a leap year.  Use a single if statement and Boolean operators.  Solution: welcome the user  prompt for input of INPUT\_YEAR type = int  store the input in constants INPUT\_YEAR    if INPUT\_YEAR < 1582  out put "i can not count that far back. I Can only evaluate years after 1582."  else if ((INPUT\_YEAR % 4 == 0 && INPUT\_YEAR % 100 > 0) OR (INPUT\_YEAR % 400 == 0))  out put "INPUT\_YEAR is a leap year"  else  out put "INPUT\_YEAR is a leap year      \*/    // declare class  **public** **class** newLeapYear{  //declare the main method  **public** **static** **void** main(String[] args) {    // welcome the user  System.*out*.println("I can tell you if it is a leap year or not.");  // get ready to read the user data  Scanner keyboard = **new** Scanner(System.*in*);  // prompt the user for INPUT\_YEAR  // store the user input  System.*out*.print("Please enter a year after 1582: ");  **final** **int** INPUT\_YEAR = keyboard.nextInt();    // do the calculation  **if** (INPUT\_YEAR < 1582){  System.*out*.println("I can not count that far back. I Can only evaluate years after 1582.");  }  **else** **if** ((INPUT\_YEAR % 4 == 0 && INPUT\_YEAR % 100 > 0) || (INPUT\_YEAR % 400 == 0)) {  System.*out*.println(INPUT\_YEAR + " is a leap year.");  }  **else**{  System.*out*.println(INPUT\_YEAR + " is NOT a leap year.");  }// if END    }//main END  }//class END |
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