Christopher Bussen

CPS 150 02 – Algorithms and Programming 1

Assignment 2

9/28/2020

**Problem E2.1 – Running Screenshot**

**Text

Description automatically generated**

**Problem E2.1 – Code**

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CPS 150 02

Assignment 2

PaperDimensionsMM; number number

program calculates and prints the dimensions of 8.5 inch by 11 inch

piece of paper converted into millimeter dimensions

1 inch = 25.4 millimeters

ex: program outputs 215.9, 279.4

\*/

public class PaperDimensionsMM {

public static void main(String[] args){

//declare double variables for dimensions of paper in inches

double width = 8.5;

double length = 11.0;

//declare double variables for converting inches to mm

double mmWidth = width \* 25.4;

double mmLength = length \* 25.4;

//print the dimensions in mm

System.out.println("The dimensions of a letter-size sheet of paper is " + mmWidth + " mm by " + mmLength + " mm");

}

}

**Problem E2.4 – Running Screenshot**

**Text

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**Problem E2.4 – Code**

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Assignment 2

IntMathFunctions: number number; number number number number number number number

program takes in two integers from the user and calculates/outputs

the sum, difference, product, average, distance, maximum, and

minimum of the two integers

ex1: user inputs 3, 8 - program outputs 11, -5, 24, 5.5, 5, 8, 3

ex2: user inputs 0, 7 - program outputs 7, -7, 0, 3.5, 7, 7, 0

ex3: user inputs -2.5, 5 - program outputs error

ex4: user inputs x, y - program outputs error

ex5: user inputs 7, -5 - program outputs 2, 12, -35, 1.0, 12, 7, -5

\*/

import java.util.Scanner;

public class IntMathFunctions {

public static void main(String[] args){

//import scanner

Scanner input = new Scanner(System.in);

//prompt the user to enter the first integer and declare an int variable to store the value

System.out.print("Please enter the first integer: ");

int firstNum = input.nextInt();

//prompt the user to enter the second integer and declare an int variable to store the value

System.out.print("Please enter the second integer: ");

int secondNum = input.nextInt();

//declare a variable to store the sum of the integers

int sum = firstNum + secondNum;

//declare an int variable to store the difference of the integers

int difference = firstNum - secondNum;

//declare an int variable to store the product of the integers

int product = firstNum \* secondNum;

//declare a double variable to store the average of the integers

double average = sum / 2.0;

//declare an int variable to store the value of the distance

int distance = Math.abs(difference);

//declare an int variable to store the value of the maximum

int maximum = Math.max(firstNum, secondNum);

//declare an int variable to store the value of the minimum

int minimum = Math.min(firstNum, secondNum);

//print all of the results

System.out.println("The sum is " + sum + ", the difference is " + difference + ", the product is " + product + ", the average is " + average + ", the distance is " + distance + ", the maximum is " + maximum + ", and the minimum is " + minimum);

}

}

**Problem E2.7 – Running Screenshot**

**Text

Description automatically generated**

**Problem E2.7 – Code**

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Assignment 2

CircleAndSphereCalculations: number; number number number number

program takes in a value for the radius from the user and calculates/

outputs the area and circumference of a circle with that radius as

well as the volume and surface area of a sphere with that radius

Circle area = pi \* r^2

Circle circumference = 2 \* pi \* r

Sphere volume = (4/3) \* pi \* r^3

Sphere surface area = 4 \* pi \* r^2

ex1: user inputs 8 - program outputs 201.061, 50.265, 2144.660, 804.247

ex2: user inputs 6.2 - program outputs 120.762, 38.955, 998.305, 483.051

ex3: user inputs -12.5 - program outputs 490.873, -78.539, -8181.230, 1963.495

ex4: user inputs x - program outputs error

ex5: user inputs 2 - program outputs 12.566, 12.566, 35.510, 50.265

\*/

import java.util.Scanner;

public class CircleAndSphereCalculations {

public static void main(String [] args){

//import scanner

Scanner input = new Scanner(System.in);

//prompt the user to enter the radius and declare a double variable to store the radius

System.out.print("Please enter the value of the radius: ");

double radius = input.nextDouble();

//declare a double variable for the area of the circle

double circleArea = Math.PI \* Math.pow(radius, 2);

//declare a double variable for the circumference of the circle

double circleCircumference = 2 \* Math.PI \* radius;

//declare a double variable for the volume of the sphere

double sphereVolume = (4.0/3) \* Math.PI \* Math.pow(radius, 3);

//declare a double variable for the surface area of the sphere

double sphereSurfaceArea = 4 \* Math.PI \* Math.pow(radius, 2);

//print all of the results

System.out.println("The area of the circle is " + circleArea + ", the circumference of the circle is " + circleCircumference + "\nThe volume of the sphere is " + sphereVolume + ", and the surface area of the sphere is " + sphereSurfaceArea);

}

}

**Problem E2.8 – Running Screenshot**

**Text

Description automatically generated**

**Problem E2.8 – Code**

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CPS 150 02

Assignment 2

RectangleCalculations: number number; number number number

program takes in the length and width of a rectangle from the

user and calculates/outputs the area, perimeter, and length of

the diagonal of the rectangle

Rectangle area = length \* width

Perimeter = 2\*length + 2\*width

Length of diagonal = sqrt (length^2 + width^2)

ex1: user inputs 3, 4 - program outputs 12.0, 14.0, 5.0

ex2: user inputs 6.4, 1.9 - program outputs 12.16, 16.6, 6.676

ex3: user inputs -12, 3.21 - program outputs -38.519, -17.58, 12.421

ex4: user inputs x, bear - program outputs error

ex5: user inputs 0.5, 0.5 - program outputs 0.25, 2.0, 0.707

\*/

import java.util.Scanner;

public class RectangleCalculations {

public static void main(String[] args){

//import scanner

Scanner input = new Scanner (System.in);

//prompt user to enter the length of the rectangle and create a variable to store the value

System.out.print("Enter the length of the rectangle: ");

double length = input.nextDouble();

//prompt user to enter the width of the rectangle and create a variable to store the value

System.out.print("Enter the width of the rectangle: ");

double width = input.nextDouble();

//declare a double variable for the area of the rectangle

double area = length \* width;

//declare a double variable for the perimeter of the rectangle

double perimeter = 2 \* length + 2 \* width;

//declare a double variable for the length of the diagonal

double diagonal = Math.sqrt(Math.pow(length, 2) + Math.pow(width, 2));

//print results

System.out.println("The area of the rectangle is " + area + ", the perimeter of is " + perimeter + ", and the length of the diagonal is " + diagonal);

}

}

**Problem E2.9 – Running Screenshot**

**Text

Description automatically generated**

**Problem E2.9 – Code**

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CPS 150 02

Assignment 2

VendingMachine: number number number; number

This program simulates a vending machine that gives change in

dollar coins and quarters

ex1: user inputs 2, 2, 175 - program outputs 0, 3

ex2: user inputs 10, 1, 525- program outputs 5, 0

ex3: user inputs 5.2, 3, 395.5 - program outputs error

ex4: user inputs x, y, z - program outputs error

ex5: user inputs 3, 0, -225 - program outputs 5, 1

\*/

import java.util.Scanner;

public class VendingMachine {

public static void main(String[] args){

//import scanner

Scanner input = new Scanner(System.in);

final int PENNIES\_PER\_DOLLAR = 100;

final int PENNIES\_PER\_QUARTER = 25;

System.out.print("Enter the bill value (1 = $1 bill, 5 = $5 bill, etc.): ");

int billValue = input.nextInt();

System.out.print("Enter the quarter value (1 = 1 quarter, 2 = two quarters, etc.): ");

int quarterValue = input.nextInt();

System.out.print("Enter item price in pennies: ");

int itemPrice = input.nextInt();

//compute change due

int changeDue = (int) (PENNIES\_PER\_DOLLAR \* (billValue + (quarterValue \* 0.25)) - itemPrice);

int dollarCoins = changeDue / PENNIES\_PER\_DOLLAR;

changeDue = changeDue % PENNIES\_PER\_DOLLAR;

int quarters = changeDue / PENNIES\_PER\_QUARTER;

//print change due

System.out.printf("Dollar coins: %6d", dollarCoins);

System.out.println();

System.out.printf("Quarters: %6d", quarters);

System.out.println();

}

}

**Problem E2.11 – Running Screenshot**

**Text

Description automatically generated**

**Problem E2.11 – Code**

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CPS 150 02

Assignment 2

GasEfficiency: number number number; number number

cost per 100 miles = (price per gallon / fuel efficiency) \* 100

how far the car can get = gallons in tank \* efficiency

program takes in the number of gallons in the gas tank, fuel efficiency (miles/gallon),

and price of gas per gallon ($), and calculates/outputs the cost per 100 miles and how

far the car can get

ex1: user inputs 5, 25, 2 - program outputs 8, 125.0

ex2: user inputs 9.5, 30, 2.5 - program outputs 8.333, 285.0

ex3: user inputs 0, 19, 2.21 - program outputs 11.631, 0.0

ex4: user inputs car, yard, boat - program outputs error

ex5: user inputs 11.5, 23.4, -3 - program outputs -12.820, 269.099

\*/

import java.util.Scanner;

public class GasEfficiency {

public static void main(String[] args){

//import scanner

Scanner input = new Scanner(System.in);

//prompt user to enter the number of gallons in the gas tank and declare a double variable to store the value

System.out.print("Enter the number of gallons in the gas tank: ");

double gallonsInTank = input.nextDouble();

//prompt user to enter the fuel efficiency and declare a double variable to store the value

System.out.print("Enter the fuel efficiency (in miles/gallon): ");

double fuelEfficiency = input.nextDouble();

//prompt user to enter the price per gallon and declare a double variable to store the value

System.out.print("Enter the price of gas per gallon ($): ");

double pricePerGallon = input.nextDouble();

//declare a double variable for the cost per 100 miles

double cost100Miles = (pricePerGallon / fuelEfficiency) \* 100;

//declare a double variable for how far the car can get with the current tank

double currentDistance = gallonsInTank \* fuelEfficiency;

//print results

System.out.println("The cost per 100 miles is " + cost100Miles + ", and the car can go " + currentDistance + " miles with the current tank");

}

}

**Problem E2.15 – Running Screenshot**

**Text

Description automatically generated**

**Problem E2.15 – Code**

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CPS 150 02

Assignment 2

TicTacToeBoard: string, string, string string

program outputs a comb-shaped string three times and a bottom line

once in order to print the shape of a tic tac toe board

ex: program should output

+--+--+--+

| | | |

+--+--+--+

| | | |

+--+--+--+

| | | |

+--+--+--+

\*/

public class TicTacToeBoard {

public static void main(String [] args){

//declare a String variable for the comb-shaped string

String comb = "+--+--+--+\n| | | |\n";

//declare a String variable for the bottom line - same as top part of comb

String bottom = "+--+--+--+";

//print the tic tac toe board by printing comb 3 times and bottom once

System.out.println(comb + comb + comb + bottom);

}

}

**Problem R2.1**

1. int daysPerWeek;
2. int daysLeftInSemester;
3. final double CM\_PER\_INCH = 2.54;
4. double tallestPerson;

**Problem R2.6**

1. 6.25
2. 6
3. 12.5
4. -3
5. Sqrt(2)

**Problem R2.9**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| a | b | Math.pow(a, b) | Math.max(a, b) | a / b | a % b | Math.floorMod(a, b) |
| 2 | 3 | 8 | 3 | 0 | 2 | 2 |
| 3 | 2 | 9 | 3 | 1 | 1 | 1 |
| 2 | -3 | 0.125 | 2 | 0 | 2 | -1 |
| 3 | -2 | 0.1111111111 | 3 | -1 | 1 | -1 |
| -3 | 2 | 9 | 2 | -1 | -1 | 1 |
| -3 | -2 | 0.1111111111 | -2 | 1 | -1 | -1 |