Christopher Bussen

CPS 150 02 – Algorithms and Programming 1

Assignment 1

9/18/20

**Program 1 – Problem 1 Algorithm**

1. Start program
2. Import scanner
3. Prompt the user to input a value for the purchase price
4. Declare a double variable to store the value of the purchase price
5. Prompt the user to input a value for the salvage value
6. Declare an double variable to store the value of salvage value
7. Prompt the user to input a value for number of years the item is used for
8. Declare an int variable to store the value of the number of years of use
9. Declare a double variable to store the value of the yearly depreciation – assign it the value of (purchase price – salvage value)/years of use
10. Print out the value of the yearly depreciation
11. End program

**Program 1 – Problem 1 Running Screenshot**

**A screenshot of a cell phone

Description automatically generated**

**Program 1 – Problem 1 Code**

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Assignment 1

YearlyDepreciation: number number number; number

program takes in values for purchase price, salvage value, and expected

years of use and then calculates and prints the yearly depreciation value

D=(P-S)/Y where D=yearly depreciation, P=purchase price, S=salvage price, and

Y=expected years of use

ex1: user inputs 100, 50, 5 - program outputs 10.0

ex2: user inputs 820.46, 201.9, 9 - program outputs 68.728

ex3: user inputs 200, 75.5, 3.6 - program outputs error

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

ex5: user inputs -500, -250.5, 4 - program outputs -62.375

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import java.util.Scanner;

public class YearlyDepreciation {

public static void main(String [] args){

//Import scanner

Scanner input = new Scanner(System.in);

//Prompt the user to input a value for the purchase price

System.out.print("Enter the purchase price: ");

//Declare a double variable to store the value of the purchase price

double purchasePrice = input.nextDouble();

//Prompt the user to input a value for the salvage value

System.out.print("Enter the salvage value: ");

//Declare an double variable to store the value of salvage value

double salvageValue = input.nextDouble();

//Prompt the user to input a value for number of years the item is used for

System.out.print("Enter the number of years the item will be used for: ");

//Declare an int variable to store the value of the number of years of use

int years = input.nextInt();

//Declare a double variable to store the value of the yearly depreciation

double depreciation = (purchasePrice - salvageValue) / years;

//Print out the value of the yearly depreciation

System.out.println("The yearly depreciation value will be $" + depreciation);

}

}

**Program 1 – Problem 2 Algorithm**

1. Start program
2. Import scanner
3. Prompt the user to input a value for the name of the first item
4. Declare a string variable to store the value of the name of the first item
5. Prompt the user to input a value for the name of the second item
6. Declare a string variable to store the value of the name of the second item
7. Prompt the user to input a value for the name of the third item
8. Declare a string variable to store the value of the name of the third item
9. Prompt the user to input a value for the quantity of the first item
10. Declare an int variable to store the value of the quantity of the first item
11. Prompt the user to input a value for the quantity of the second item
12. Declare an int variable to store the value of the quantity of the second item
13. Prompt the user to input a value for the quantity of the third item
14. Declare an int variable to store the value of the quantity of the third item
15. Prompt the user to input a value for price of the first item
16. Declare a double variable to store the value of the price of the first item
17. Prompt the user to input a value for price of the second item
18. Declare a double variable to store the value of the price of the second item
19. Prompt the user to input a value for price of the third item
20. Declare a double variable to store the value of the price of the third item
21. Declare a double variable to store the value of the tax rate (6.25%)
22. Declare a double variable to store the total price on the bill – (quantity of each item \* price of each item) \* 1.0625
23. Print out the total bill price
24. End program

**Program 1 – Problem 2 Running Screenshot**

**A screenshot of a computer

Description automatically generated**

**Program 1 – Problem 2 Code**

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Assignment 1

ItemBill: String string string number number number number number number; number

program takes in values for names of three different items, quantity of each

item, and price of each item, then calculates and prints the total price on the bill

Total=(quantity of each item \* price of each item) \* (1 + tax rate)

ex1: user inputs apple, orange, banana, 1, 1, 2, 5, 6, 7 - program outputs 26.5625

ex2: user inputs ketchup, mayo, crackers, 2, 2, 3, 3.5, 3.23, 2.5 - program outputs 22.27

ex3: user inputs 5, 8, 4, 5, 8, 4, cheese, water, granola - program outputs error

ex4: user inputs cheese, water, granola, 5.4, 1.2, 3, 5, 6, 9 - program outputs error

ex5: user inputs tissues, toilet paper, soap, 2, 1, 1, -6, -3, 1.2 - program outputs -14.6625

\*/

import java.util.Scanner;

public class ItemBill {

public static void main(String [] args){

//Import scanner

Scanner input = new Scanner(System.in);

//Prompt the user to input a value for the name of the first item

System.out.print("Enter the name of the first item: ");

//Declare a string variable to store the value of the name of the first item

String item1 = input.nextLine();

//Prompt the user to input a value for the name of the second item

System.out.print("Enter the name of the second item: ");

//Declare a string variable to store the value of the name of the second item

String item2 = input.nextLine();

//Prompt the user to input a value for the name of the third item

System.out.print("Enter the name of the third item: ");

//Declare a string variable to store the value of the name of the third item

String item3 = input.nextLine();

//Prompt the user to input a value for the quantity of the first item

System.out.print("Enter the quantity of " + item1 + ": ");

//Declare an int variable to store the value of the quantity of the first item

int quantity1 = input.nextInt();

//Prompt the user to input a value for the quantity of the second item

System.out.print("Enter the quantity of " + item2 + ": ");

//Declare an int variable to store the value of the quantity of the second item

int quantity2 = input.nextInt();

//Prompt the user to input a value for the quantity of the third item

System.out.print("Enter the quantity of " + item3 + ": ");

//Declare an int variable to store the value of the quantity of the third item

int quantity3 = input.nextInt();

//Prompt the user to input a value for price of the first item

System.out.print("Enter the price of " + item1 + ": ");

//Declare a double variable to store the value of the price of the first item

double price1 = input.nextDouble();

//Prompt the user to input a value for price of the second item

System.out.print("Enter the price of " + item2 + ": ");

//Declare a double variable to store the value of the price of the second item

double price2 = input.nextDouble();

//Prompt the user to input a value for price of the third item

System.out.print("Enter the price of " + item3 + ": ");

//Declare a double variable to store the value of the price of the third item

double price3 = input.nextDouble();

//Declare a double variable to store the value of the tax rate (6.25%)

double taxRate = 0.0625;

//Declare a double variable to store the total price on the bill

double totalPrice = (quantity1\*price1 + quantity2\*price2 + quantity3\*price3) \* (1+taxRate);

//Print out the total bill price

System.out.println("The total price of the bill will be $" + totalPrice);

}

}

**Program 1 – Problem 3 Algorithm**

1. Start program
2. Import scanner
3. Prompt the user to input a value for balance of their account
4. Declare a double variable to store the value of the user’s account
5. Declare a double variable for the annual interest rate (10%)
6. Declare a double variable for the new balance of the account – original balance \* (1 + (annual interest rate / 4)) --- divide annual interest rate by 4 because we’re finding balance after 3 months
7. Print out the new value of the user’s balance
8. End program

**Program 1 – Problem 3 Running Screenshot**

**A screenshot of a cell phone

Description automatically generated**

**Program 1 – Problem 3 Code**

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Assignment 1

BankGrowth: number; number

program takes in a value from the user for their bank account balance, then

uses the annual interest rate to calculate and print the user's balance after

3 months

ex1: user inputs 100 - program outputs 102.5

ex2: user inputs 820.46 - program outputs 840.9715

ex3: user inputs 100456.98 - program outputs 102968.4045

ex4: user inputs x - program outputs error

ex5: user inputs -500.5 - program outputs -513.0125

\*/

import java.util.Scanner;

public class BankGrowth {

public static void main(String [] args){

//Import scanner

Scanner input = new Scanner(System.in);

//Prompt the user to input a value for balance of their account

System.out.print("Enter your current balance: $");

//Declare a double variable to store the value of the user’s account

double balance = input.nextDouble();

//Declare a double variable for the annual interest rate (10%)

double apr = 0.10;

//Declare a double variable for the new balance of the account

double newBalance = balance \* (1 + (apr / 4.0));

//Print out the new value of the user’s balance

System.out.println("Your balance after 3 months will be: $" + newBalance);

}

}

**Program 2 – Problem 1 Table**

Table for L4 Values

|  |  |  |  |
| --- | --- | --- | --- |
| θ2 (deg) | θ3 (deg) | Y (deg) | L4 (cm) |
| 0 | 25.377 | 154.623 | 93.246 |
| 10 | 30.198 | 139.802 | 90.045 |
| 20 | 35.11 | 124.89 | 85.454 |
| 30 | 40.005 | 109.995 | 79.6 |
| 40 | 44.753 | 95.247 | 72.692 |

**Program 2 – Problem 2 Algorithm**

1. Start program
2. Import scanner
3. Prompt the user to input a value for θ2 (in degrees)
4. Declare a double variable to store the value of θ2
5. Convert θ2 to radians to be used in later trig calculations
6. Declare a double variable to store the value of the offset between the crank pin and the slider pin (L1 = 30 cm)
7. Declare a double variable to store the length of the arm crank (L2 = 30 cm)
8. Declare a double variable to store the length of the connecting rod (L3 = 70 cm)
9. Declare a double variable to store the value of θ3 – equal to sin-1((L1 + L2sinθ2) / L3)
10. Declare a double variable to store the value of the displacement of the slider (L4) – equal to L2cosθ2 + L3cosθ3
11. Print out the value of the displacement of the slider (L4)
12. End program

**Program 2 – Problem 3 Running Screenshot**

**A screenshot of a cell phone

Description automatically generated**

**Program 2 – Problem 3 Code**

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Assignment 1

SliderDisplacement: number; number

program takes in a value from the user for θ2, and uses that and other

given variables to calculate and print out the displacement of the slider

in the mechanism

θ3 = sin-1((L1 + L2sinθ2) / L3)

L4 = L2cosθ2 + L3cosθ3

ex1: user inputs 0 - program outputs 93.246

ex2: user inputs 30 - program outputs 79.6

ex3: user inputs 156.98 - program outputs 28.589

ex4: user inputs xenon - program outputs error

ex5: user inputs -13.56 - program outputs 95.289

\*/

import java.util.Scanner;

public class SliderDisplacement {

public static void main(String [] args){

//Import scanner

Scanner input = new Scanner(System.in);

//Prompt the user to input a value for θ2 (in degrees)

System.out.print("Enter the value for θ2 (in degrees): ");

//Declare a double variable to store the value of θ2

double angle2 = input.nextDouble();

//need to convert to radians so it can be used in later trig calculations

angle2 = Math.toRadians(angle2);

//System.out.println(angle2); -- used as a check

//Declare a double variable to store the given value of the offset between the crank pin and slider pin

double l1 = 30;

//Declare a double variable to store the given length of the arm crank

double l2 = 30;

//Declare a double variable to store the given length of the connecting rod

double l3 = 70;

//Declare a double variable to store the value of θ3 – equal to sin^-1((L1 + L2sinθ2) / L3)

double angle3 = Math.asin((l1 + l2\*Math.sin(angle2)) / l3);

//System.out.println(angle3); -- used as a check

//Declare a double variable to store the value of the displacement of the slider

double l4 = l2\*Math.cos(angle2) + l3\*Math.cos(angle3);

//Print out the value of the displacement of the slider (L4)

System.out.println("The total displacement of the slider is " + l4 + " cm");

}

}