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CPS 150 02 – Algorithms and Programming 1

Lab 8

10/1/2020

**Problem 1 Algorithm**

1. Start program
2. Import scanner
3. Prompt the user to enter an integer
4. Declare an int variable to store the value of the integer entered by the user
5. Use if statements as shown in the code fragment to determine how many digits the user’s integer has
6. Use a separate if statement to see if the integer is less than zero, and if so, multiply the amount of digits by -1
7. Print the total number of digits in the given integer
8. End the program

**Problem 1 Running Screenshot**

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**Problem 1 Code**

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IntegerDigits: number; number

program takes in an integer from the user and prints out the number

of digits in the given integer

ex1: user inputs 5 - program outputs 1

ex2: user inputs 5300009 - program outputs 7

ex3: user inputs -1067 - program outputs -4

ex4: user inputs x - program outputs error

ex5: user inputs 122.4 - program outputs error

\*/

import java.util.Scanner;

public class IntegerDigits {

public static void main(String [] args){

//import scanner

Scanner input = new Scanner(System.in);

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

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

int userNumber = input.nextInt();

//declare variable to store number of digits

int digits;

//use if statements to see how many digits number has

if(Math.abs(userNumber) > 999999999){

digits = 10;

}

else if(Math.abs(userNumber) > 99999999){

digits = 9;

}

else if(Math.abs(userNumber) > 9999999){

digits = 8;

}

else if(Math.abs(userNumber) > 999999){

digits = 7;

}

else if(Math.abs(userNumber) > 99999){

digits = 6;

}

else if(Math.abs(userNumber) > 9999){

digits = 5;

}

else if(Math.abs(userNumber) > 999){

digits = 4;

}

else if(Math.abs(userNumber) > 99){

digits = 3;

}

else if(Math.abs(userNumber) > 9){

digits = 2;

}

else {

digits = 1;

}

//use separate if statement to add negative before number of digits when necessary

if(userNumber < 0){

digits = digits \* -1;

}

//print out the number of digits in the given integer

System.out.println("The number " + userNumber + " has " + digits + " digits");

}

}

**Problem 2 Algorithm**

1. Start program
2. Import scanner
3. Prompt the user to enter the hour number for the first time
4. Declare an int variable to store the hour number of the first time
5. Prompt the user to enter the minute number for the first time
6. Declare an int variable to store the minute number of the first time
7. Prompt the user to enter the hour number for the second time
8. Declare an int variable to store the hour number of the second time
9. Prompt the user to enter the minute number for the second time
10. Declare an int variable to store the minute number of the second time
11. Use if statements (as shown in the question’s pseudocode) to compare the times – print the earlier time first and the later time second
12. End the program

**Problem 2 Running Screenshot**

**Text

Description automatically generated**

**Problem 2 Code**

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MilitaryTimeComparison: number number number number; number number number number

program takes in the hour number and minute number of two different

military times from the user and compares and prints out the earlier

time followed by the later time

ex1: user inputs 10, 12, 16, 20 - program outputs 10:12, 16:20

ex2: user inputs 12, 45, 8, 15 - program outputs 8:15, 12:45

ex3: user inputs -02, 37, 11, 12 - program outputs -02:37, 11:12

ex4: user inputs x, alpha, cookie, cheese - program outputs error

ex5: user inputs 1.4, 2, 3.9, 22 - program outputs error

\*/

import java.util.Scanner;

public class MilitaryTimeComparison {

public static void main(String [] args){

//import scanner

Scanner input = new Scanner(System.in);

//prompt the user to enter the hour number of the first time and declare an int variable to store the value

System.out.print("Enter the hour number of the first time: ");

int hour1 = input.nextInt();

//prompt the user to enter the minute number of the first time and declare an int variable to store the value

System.out.print("Enter the minute number of the first time: ");

int minute1 = input.nextInt();

//prompt the user to enter the hour number of the second time and declare an int variable to store the value

System.out.print("Enter the hour number of the first time: ");

int hour2 = input.nextInt();

//prompt the user to enter the minute number of the second time and declare an int variable to store the value

System.out.print("Enter the hour number of the first time: ");

int minute2 = input.nextInt();

//use if statements to compare the times and see which one should be printed first

if(hour1 < hour2) {

System.out.println(hour1 + ":" + minute1 + " comes before " + hour2 + ":" + minute2);

}

else if(hour1 == hour2){

if(minute1 < minute2){

System.out.println(hour1 + ":" + minute1 + " comes before " + hour2 + ":" + minute2);

}

else if(minute1 == minute2){

System.out.println(hour1 + ":" + minute1 + " and " + hour2 + ":" + minute2 + " are the same time");

}

else{

System.out.println(hour2 + ":" + minute2 + " comes before " + hour1 + ":" + minute1);

}

}

else{

System.out.println(hour2 + ":" + minute2 + " comes before " + hour1 + ":" + minute1);

}

}

}

**Problem 3.a. Algorithm**

1. Start the program
2. Import scanner
3. Prompt the user to input a value for the temperature in degrees Celsius
4. Declare a double variable to store the value of degrees Celsius input by user
5. Create a separate method that will be used to convert the temperature to degrees Fahrenheit – will take in a double x and be called in main method
6. Declare a double variable for Fahrenheit that calculates the temperature – it should be equal to (9 \* x) / 5 + 32
7. Print the converted temperature in degrees Fahrenheit
8. End the converter method
9. Call the converter method in the main method using the double variable for degrees Celsius
10. End the main method
11. End the program

**Problem 3.a. Running Screenshot**

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**Problem 3.a. Code**

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Lab 7

CelsiusToFahrenheit: number; number

program takes in the temperature in degrees Celsius from the user and

calculates and outputs the temperature in degrees Fahrenheit

Fahrenheit = (9/5)(Celsius)+32

ex1: user inputs 0 - program outputs 32

ex2: user inputs 8.2 - program outputs 46.76

ex3: user inputs -12 - program outputs 10.4

ex4: user inputs x - program outputs error

ex5: user inputs -22 - program outputs -7.6

\*/

import java.util.Scanner;

public class CelsiusToFahrenheit {

public static void main(String [] args){

//Import scanner

Scanner input = new Scanner(System.in);

//prompt the user to input a value for the temperature in degrees Celsius

System.out.print("Enter the temperature (in degrees Celsius): ");

//declare double variable to store the degrees Celsius input by user

double celsius = input.nextDouble();

//call converter method and use user input

converter(celsius);

} //end main method

//create separate method that takes in a double for converting temperature to Fahrenheit

public static void converter(double x){

//declare double variable for Fahrenheit that calculates temperature using the correct equation

double fahrenheit = (9 \* x) / 5 + 32;

//print the new converted temperature in degrees Fahrenheit

System.out.println("The temperature is " + fahrenheit + " degrees Fahrenheit");

} //end converter method

} //end program

**Problem 3.b. Algorithm**

1. Start the program
2. Import scanner
3. Prompt the user to input a value for the temperature in degrees Celsius
4. Declare a double variable to store the value of degrees Celsius input by user
5. Create a separate method that will be used to convert the temperature to degrees Fahrenheit – will take in a double x and be called in main method
6. Declare a double variable for Fahrenheit that calculates the temperature – it should be equal to (9 \* x) / 5 + 32
7. Print the converted temperature in degrees Fahrenheit
8. Use if statements to print out what type of clothes should be packed depending on what the temperature will be (use chart shown in problem)
9. End the converter method
10. Call the converter method in the main method using the double variable for degrees Celsius
11. End the main method
12. End the program

**Problem 3.b. Running Screenshot**

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**Problem 3.b. Code**

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CelsiusToFahrenheitB: number; number, string

program takes in the temperature in degrees Celsius from the user and

calculates and outputs the temperature in degrees Fahrenheit as well as

giving suggestions for clothes to pack based on the temperature

Fahrenheit = (9/5)(Celsius)+32

ex1: user inputs 0 - program outputs 32

ex2: user inputs 8.2 - program outputs 46.76

ex3: user inputs -12 - program outputs 10.4

ex4: user inputs x - program outputs error

ex5: user inputs -22 - program outputs -7.6

\*/

import java.util.Scanner;

public class CelsiusToFahrenheitB {

public static void main(String [] args){

//Import scanner

Scanner input = new Scanner(System.in);

//prompt the user to input a value for the temperature in degrees Celsius

System.out.print("Enter the temperature (in degrees Celsius): ");

//declare double variable to store the degrees Celsius input by user

double celsius = input.nextDouble();

//call converter method and use user input

converter(celsius);

} //end main method

//create separate method that takes in a double for converting temperature to Fahrenheit

public static void converter(double x){

//declare double variable for Fahrenheit that calculates temperature using the correct equation

double fahrenheit = (9 \* x) / 5 + 32;

//print the new converted temperature in degrees Fahrenheit

System.out.println("The temperature is " + fahrenheit + " degrees Fahrenheit");

//tell user what type of clothes should be packed based on temperature

if(x >= 20) {

System.out.println("Pack short clothes for warm weather.");

}

else if(x >= 10) {

System.out.println("Pack long pants and a long shirt for moderate weather.");

}

else if (x >= 0) {

System.out.println("Pack warm clothes, a jacket, gloves, and a hat for chilly weather.");

}

else if(x >= -10) {

System.out.println("Pack warm clothes, a coat, gloves, a hat, and boots for cold weather.");

}

else {

System.out.println("Pack several warm layers, a coat, gloves, a hat, boots, and more for very cold weather.");

}

} //end converter method

} //end program