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**LAB SESSION 2**

**INTRODUCTION TO DART PROGRAMMING**

1. **Calculate Simple Interest:** Write a Dart program to calculate the simple interest given the principal amount, rate of interest, and time period.

import 'dart:io';

void main() {

  print("Enter the principal amount");

  double principal = double.parse(stdin.readLineSync()!);

  print("Enter the rate of interest");

  double rate = double.parse(stdin.readLineSync()!);

  print("Enter the time period");

  double time = double.parse(stdin.readLineSync()!);

  double interest = principal \* rate \* time / 100;

  print("Simple Interest: " + interest.toStringAsFixed(2));

}

2. **Convert Temperature:** Write a Dart program to convert temperature from Celsius to Fahrenheit and vice versa.

import 'dart:io';

void main() {

  print("Enter 'C' for Celsius to Fahrenheit Conversion, or 'F' for Fahrenheit to Celsius Conversion: ");

  String choice = stdin.readLineSync()!.toUpperCase();

  print("Enter the temperature: ");

  double temperature = double.parse(stdin.readLineSync()!);

  double convertedTemp;

  String unit;

  if (choice == 'C') {

    convertedTemp = temperature \* 9 / 5 + 32;

    unit = 'Fahrenheit';

  } else if (choice == 'F') {

    convertedTemp = (temperature - 32) \* 5 / 9;

    unit = 'Celsius';

  } else {

    print("Invalid choice. Please enter 'C' or 'F'.");

    return; // Exit the program on invalid input

  }

  print("The converted temperature is: $convertedTemp $unit");

}

3. **Check Leap Year:** Write a Dart program to check if a given year is a leap year or not.

import 'dart:io';

void main() {

  print("Enter a year: ");

  int year = int.parse(stdin.readLineSync()!);

  if (year % 4 == 0) {

    if (year % 100 == 0 && year % 400 != 0) {

      print("$year is not a leap year.");

    } else {

      print("$year is a leap year.");

    }

  } else {

    print("$year is not a leap year.");

  }

}

4. **Calculate Factorial:** Write a Dart program to calculate the factorial of a given number.

import 'dart:io';

int factorial(int n) {

  if (n < 0) {

    return -1; // Or throw an exception for negative input

  }

  int result = 1;

  for (int i = 1; i <= n; i++) {

    result \*= i;

  }

  return result;

}

void main() {

  print("Enter a number: ");

  int number = int.parse(stdin.readLineSync()!);

  int result = factorial(number);

  if (result == -1) {

    print("Factorial is not defined for negative numbers.");

  } else {

    print("The factorial of $number is $result");

  }

}

5. **Check Prime Number:** Write a Dart program to check if a given number is prime or not.

import 'dart:io';

void main() {

  print("Enter a number: ");

  int number = int.parse(stdin.readLineSync()!);

  if (number <= 1) {

    print("$number is not a prime number.");

    return; // Exit early for non-positive numbers

  }

  bool isPrime = true;

  for (int i = 2; i <= number / 2; i++) {

    if (number % i == 0) {

      isPrime = false;

      break;

    }

  }

  print(isPrime ? "$number is a prime number." : "$number is not a prime number.");

}

6. **Generate Fibonacci Series:** Write a Dart program to generate the Fibonacci series up to a given number of terms.

import 'dart:io';

int fibonacci(int n) {

  if (n <= 1) {

    return n;

  } else {

    return fibonacci(n - 1) + fibonacci(n - 2);

  }

}

void main() {

  print("Enter the number of terms: ");

  int terms = int.parse(stdin.readLineSync()!);

  for (int i = 0; i < terms; i++) {

    int fib = fibonacci(i);

    print(fib);

  }

}

7. **Reverse a String:** Write a Dart program to reverse a given string.

import 'dart:io';

String reverseString(String str) {

  return str.split('').reversed.join('');

}

void main() {

  print("Enter a string: ");

  String inputString = stdin.readLineSync()!;

  String reversedString = reverseString(inputString);

  print("Reversed string: $reversedString");

}

8. **Find Maximum Number:** Write a Dart program to find the maximum number among three given numbers.

import 'dart:io';

import 'dart:math';

void main() {

  print("Enter first number: ");

  double num1 = double.parse(stdin.readLineSync()!);

  print("Enter second number: ");

  double num2 = double.parse(stdin.readLineSync()!);

  print("Enter third number: ");

  double num3 = double.parse(stdin.readLineSync()!);

  double maxNumber = max(num1, max(num2, num3));

  print("Maximum number: $maxNumber");

}

9. **Calculate BMI:** Write a Dart program to calculate the Body Mass Index (BMI) given the weight (in kilograms) and height (in meters) of a person.

import 'dart:io';

void main() {

  print("Enter weight (kg): ");

  double weight = double.parse(stdin.readLineSync()!);

  print("Enter height (meters): ");

  double height = double.parse(stdin.readLineSync()!);

  double bmi = weight / (height \* height);

  print("BMI: ${bmi.toStringAsFixed(2)}");

}

10. **Find Roots of Quadratic Equation:** Write a Dart program to find the roots of a quadratic equation ax^2 + bx + c = 0 given the coefficients a, b, and c.

import 'dart:io';

void main() {

  print("Enter coefficient a: ");

  double a = double.parse(stdin.readLineSync()!);

  print("Enter coefficient b: ");

  double b = double.parse(stdin.readLineSync()!);

  print("Enter coefficient c: ");

  double c = double.parse(stdin.readLineSync()!);

  double discriminant = b \* b - 4 \* a \* c;

  if (discriminant > 0) {

    // Two real and distinct roots

    double root1 = (-b + sqrt(discriminant)) / (2 \* a);

    double root2 = (-b - sqrt(discriminant)) / (2 \* a);

    print("Roots: x1 = $root1, x2 = $root2");

  } else if (discriminant == 0) {

    // Two real and equal roots

    double root = -b / (2 \* a);

    print("Roots: x1 = x2 = $root");

  } else {

    // Two complex roots

    double realPart = -b / (2 \* a);

    double imaginaryPart = sqrt(-discriminant) / (2 \* a);

    print("Roots: x1 = $realPart + $imaginaryPart i, x2 = $realPart - $imaginaryPart i");

  }

}

11. **Check Palindrome Number:** Write a Dart program to check if a given number is a palindrome or not.

import 'dart:io';

bool isPalindrome(int number) {

  if (number < 0) {

    return false;

      }

  int reversed = 0;

  int original = number;

  if (number < 10) {

    return true;

  }

  while (number != 0) {

    int digit = number % 10;

    reversed = reversed \* 10 + digit;

    number ~/= 10;

    }

  return original == reversed;

}

void main() {

  print("Enter a number: ");

  int number = int.parse(stdin.readLineSync()!);

  if (isPalindrome(number)) {

    print("$number is a palindrome.");

  } else {

    print("$number is not a palindrome.");

  }

}