Q1 Typescript Assignment

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1- Task: Create a Program to Calculate Student Grades

Breakdown:

- Declare two variables for the exam scores, e.g., englishMarks and urduMarks, and assign them values.
- Calculate the average of the two exams using the formula: (englishMarks + urduMarks) / 2
- Use if-else conditionals to determine the student's grade based on the average score.
- For example, if the average score is greater than or equal to 80, assign grade "A", if it is greater than or equal to 70 and less than 80, assign grade "B", and so on until grade "F" for a score below 60.
- Display the grade to the user as output.

1- Task:

Solution 1_ Create a Program to Calculate Student Grades

```
let englishMarks: number = 85;
let urduMarks: number = 75;

let average: number = (englishMarks + urduMarks) / 2;

let grade: string;

if (average >= 80) {
  grade = "A";
} else if (average >= 70) {
  grade = "B";
} else if (average >= 60) {
  grade = "C";
} else if (average >= 50) {
  grade = "D";
} else {
  grade = "F";
}
```

VS Code:

```typescript
// 1- Task: Create a Program to Calculate Student Grades


let englishMarks: number = 85;
let urduMarks: number = 75;

let average: number = (englishMarks + urduMarks) / 2;

let grade: string;

if (average >= 80) {
    grade = "A";
} else if (average >= 70) {
    grade = "B";
} else if (average >= 60) {
    grade = "C";
} else if (average >= 50) {
    grade = "D";
} else {
    grade = "F";
}

console.log(`The student's grade is ${grade}`);
```

Output:

```
C:\Users\DELL\OneDrive\Documents\Q1AssignmentTypescript>node Q1.js
The student's grade is A
```

Solution 2_ University Grading System

```typescript
let perc = 45
if (perc >= 90) {
  console.log("A+");
} else if (perc >= 85 && perc < 90) {
  console.log("A");
} else if (perc >= 75 && perc < 85) {
  console.log("B+");
} else if (perc >= 70 && perc < 75) {
  console.log("B");
} else if (perc >= 65 && perc < 70) {
  console.log("C+");
```

```
        } else if (perc >= 60 && perc < 65) {
          console.log("C");
        } else if (perc >= 55 && perc < 60) {
          console.log("D");
        } else if (perc < 50) {
          console.log("Fail");


        }
        console.log(perc);
```

VS Code:

```
let perc = 45
if (perc >= 90) {
  console.log("A+");
} else if (perc >= 85 && perc < 90) {
  console.log("A");
} else if (perc >= 75 && perc < 85) {
  console.log("B+");
} else if (perc >= 70 && perc < 75) {
  console.log("B");
} else if (perc >= 65 && perc < 70) {
  console.log("C+");
} else if (perc >= 60 && perc < 65) {
  console.log("C");
} else if (perc >= 55 && perc < 60) {
  console.log("D");
} else if (perc < 50) {
  console.log("Fail");


}
console.log(perc);
```

Output:

```
C:\Users\DELL\OneDrive\Documents\Q1AssignmentTypescript>node Q1.js
Fail
45
```

2- Task: Create an Array Manipulation Program

Breakdown:

- Declare an array of strings, e.g. **["apple", "banana", "cherry", "date", "elderberry"]**
- Use array methods to perform the following manipulations:
    - Append a string to the end of the array
    - Prepend a string to the beginning of the array
    - Remove a string from a specific index in the array and replace it with another string
- Display the array before and after each manipulation to the user as output.

Typescript Program:

```typescript
let fruits: string[] = ["apple", "banana", "cherry", "date", "elderberry"];
console.log("Original array: " + fruits);

// Append a string to the end of the array
fruits.push("fig");
console.log("After appending 'fig': " + fruits);

// Prepend a string to the beginning of the array
fruits.unshift("apricot");
console.log("After prepending 'apricot': " + fruits);

// Remove a string from a specific index in the array and replace it with another string
const indexToRemove = 2;
const newFruit = "grape";
fruits.splice(indexToRemove, 1, newFruit);
console.log(`After replacing ${fruits[indexToRemove-1]} with '${newFruit}' at index ${indexToRemove}: ` + fruits);
```

VS Code:

```
let fruits: string[] = ["apple", "banana", "cherry", "date", "elderberry"];
console.log("Original array: " + fruits);

// Append a string to the end of the array
fruits.push("fig");
console.log("After appending 'fig': " + fruits);

// Prepend a string to the beginning of the array
fruits.unshift("apricot");
console.log("After prepending 'apricot': " + fruits);

// Remove a string from a specific index in the array and replace it with another string
const indexToRemove = 2;
const newFruit = "grape";
fruits.splice(indexToRemove, 1, newFruit);
console.log(`After replacing ${fruits[indexToRemove-1]} with '${newFruit}' at index ${indexToRemove}: ` + fruits);
```

Output:

```
C:\Users\DELL\OneDrive\Documents\Q1AssignmentTypescript>tsc Q1.ts

C:\Users\DELL\OneDrive\Documents\Q1AssignmentTypescript>node Q1.js
Original array: apple,banana,cherry,date,elderberry
After appending 'fig': apple,banana,cherry,date,elderberry,fig
After prepending 'apricot': apricot,apple,banana,cherry,date,elderberry,fig
After replacing apple with 'grape' at index 2: apricot,apple,grape,cherry,date,elderberry,fig
```

3- Task: Create a Function to Determine the Discount Amount for a Product

Breakdown:

- Create a function that takes a product price and a discount percentage as input and calculates the discount amount for the product using the formula: discount amount = product price * (discount percentage / 100).
- If the discount percentage is greater than or equal to 50%, the function should return an error message indicating that the discount percentage is invalid.
- Display the original price, discount percentage, discount amount, and final price of the product to the user as output.
- Test the function with different product prices and discount percentages.

Typescript Program:

```
function calculateDiscount(productPrice: number, discountPercentage: number): number |
string {
  if (discountPercentage >= 100) {
    return "Error: Invalid discount percentage.";
  }
```

```
const discountAmount = productPrice * (discountPercentage / 100);
const finalPrice = productPrice - discountAmount;
console.log(`Original price: Rs. ${productPrice}`);
console.log(`Discount percentage: ${discountPercentage}%`);
console.log(`Discount amount: Rs. ${discountAmount}`);
console.log(`Final price: Rs. ${finalPrice}`);
return finalPrice;
}

// Test the function with different inputs
calculateDiscount(100, 20);
calculateDiscount(250, 40);
calculateDiscount(400, 60);
```

VS Code:

```typescript
// Create a Function to Determine the Discount Amount for a Product

function calculateDiscount(productPrice: number, discountPercentage: number): number | string {
    if (discountPercentage >= 100) {
      return "Error: Invalid discount percentage.";
    }
    const discountAmount = productPrice * (discountPercentage / 100);
    const finalPrice = productPrice - discountAmount;
    console.log(`Original price: Rs. ${productPrice}`);
    console.log(`Discount percentage: ${discountPercentage}%`);
    console.log(`Discount amount: Rs. ${discountAmount}`);
    console.log(`Final price: Rs. ${finalPrice}`);
    return finalPrice;
}

// Test the function with different inputs
calculateDiscount(100, 20);
calculateDiscount(250, 40);
calculateDiscount(400, 60);
```

Output:

```
C:\Users\DELL\OneDrive\Documents\Q1AssignmentTypescript>node Q1.js
Original price: Rs. 100
Discount percentage: 20%
Discount amount: Rs. 20
Final price: Rs. 80
Original price: Rs. 250
Discount percentage: 40%
Discount amount: Rs. 100
Final price: Rs. 150
Original price: Rs. 400
Discount percentage: 60%
Discount amount: Rs. 240
Final price: Rs. 160
```

4- Task: Create a Function to Calculate the Factorial of a Number

Breakdown:

- Create a function that takes a number as input and calculates its factorial using a loop.
- The factorial of a number is the product of all positive integers less than or equal to the number. For example, the factorial of 5 is 5 x 4 x 3 x 2 x 1 = 120.
- The function should return the factorial of the input number.
- Test the function with different numbers to make sure it is working correctly.

Typescript Program:

```
function calculateFactorial(num: number): number {
  let factorial: number = 1;  // initialize factorial to 1

  for (let i = 1; i <= num; i++) {
    factorial *= i;  // multiply factorial by the current number in the loop
  }

  return factorial;  // return the final factorial value
}

// Testing the function with different numbers
console.log(calculateFactorial(5));  // output: 120
console.log(calculateFactorial(0));  // output: 1
console.log(calculateFactorial(10)); // output: 3628800
```

VS Code:

```typescript
// Create a Function to Calculate the Factorial of a Number

function calculateFactorial(num: number): number {
  let factorial: number = 1;  // initialize factorial to 1

  for (let i = 1; i <= num; i++) {
    factorial *= i;  // multiply factorial by the current number in the loop
  }

  return factorial;  // return the final factorial value
}

// Testing the function with different numbers
console.log(calculateFactorial(5));  // output: 120
console.log(calculateFactorial(0));  // output: 1
console.log(calculateFactorial(10)); // output: 3628800
```

Output:

```
PS C:\Users\DELL\OneDrive\Documents\Q1AssignmentTypescript> tsc Q1.ts
PS C:\Users\DELL\OneDrive\Documents\Q1AssignmentTypescript> node Q1.js
120
1
3628800
```