UGANDA MARTYRS UNIVERSITY, NKOZI

FACULTY: SCIENCE

COURSE: COMPUTER SCIENCE

COURSE UNIT: STRUCTURED PROGRAMMING.

LECTURER: MR. KASAAZI GEORGE WILLIAM

NAME: KATEREGGA JOSEPH TRAVOUR.

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1.**A C program that calculates the average score and corresponding grade for a student based on three exam scores**.

```c
#include <stdio.h>

// Function to calculate the average score
double calculateAverage(int scores[], int numSubjects) {
    int sum = 0;
    for (int i = 0; i < numSubjects; ++i) {
        sum += scores[i];
    }
    return (double)sum / numSubjects;
}

// Function to determine the corresponding grade
char determineGrade(double average) {
    if (average >= 90) {
        return 'A';
    } else if (average >= 80) {
        return 'B';
    } else if (average >= 70) {
        return 'C';
    } else if (average >= 60) {
        return 'D';
    } else {
        return 'F';
    }
}

int main() {
    const int numSubjects = 5;
    int scores[numSubjects];

    // Input scores
    printf("Enter scores for the five subjects:\n");
    for (int i = 0; i < numSubjects; ++i) {
        printf("Subject %d: ", i + 1);
        scanf("%d", &scores[i]);
    }

    // Calculate average
    double average = calculateAverage(scores, numSubjects);

    // Determine grade
    char grade = determineGrade(average);

    // Display results
    printf("Average Score: %.2lf\n", average);
    printf("Grade: %c\n", grade);

    return 0;
}
```

```
Enter scores for the five subjects:
Subject 1: 85
Subject 2: 99
Subject 3: 77
Subject 4: 84
Subject 5: 91
Average Score: 87.20
Grade: B
```

2. **A C program that converts temperatures between Celsius and Fahrenheit**.

```c
#include <stdio.h>

// Function to convert Celsius to Fahrenheit
double celsiusToFahrenheit(double celsius) {
    return (celsius * 9 / 5) + 32;
}

// Function to convert Fahrenheit to Celsius
double fahrenheitToCelsius(double fahrenheit) {
    return (fahrenheit - 32) * 5 / 9;
}

int main() {
    int choice;
    double temperature;

    printf("Temperature Conversion Menu:\n");
    printf("1. Celsius to Fahrenheit\n");
    printf("2. Fahrenheit to Celsius\n");
    printf("3. Exit\n");
    printf("Enter your choice (1 or 2 or 3): ");
    scanf("%d", &choice);
```

```c
    printf("Enter the temperature: ");
    scanf("%lf", &temperature);

    switch (choice) {
        case 1:
            printf("%.2lf Celsius is %.2lf Fahrenheit\n",
                temperature, celsiusToFahrenheit(temperature));
            break;
        case 2:
            printf("%.2lf Fahrenheit is %.2lf Celsius\n",
                temperature, fahrenheitToCelsius(temperature));
            break;
        default:
            printf("Invalid choice\n");
            break;
    }
}
```

```
Temperature Conversion Menu:
1. Celsius to Fahrenheit
2. Fahrenheit to Celsius
3. Exit
Enter your choice (1 or 2 or 3): 2
Enter the temperature: 98.6
98.60 Fahrenheit is 37.00 Celsius
```

3.A C program that displays a calculator that performs calculations and display results.

```c
#include <stdio.h>
#include <math.h>

// Function to perform addition
double add(double a, double b) {
    return a + b;
}

// Function to perform subtraction
double subtract(double a, double b) {
    return a - b;
}

// Function to perform multiplication
double multiply(double a, double b) {
    return a * b;
}

// Function to perform division
double divide(double a, double b) {
    if (b != 0) {
        return a / b;
    } else {
        printf("Error: Division by zero\n");
        return 0;
    }
}

// Function to perform exponentiation
double power(double base, double exponent) {
    return pow(base, exponent);
}

// Function to perform square root
double squareRoot(double number) {
    if (number >= 0) {
        return sqrt(number);
    } else {
        printf("Error: Cannot calculate square root of a negative
            number\n");
        return 0;
    }
}
```

```c
int main() {
    int choice;
    double num1, num2, result;

    do {
        printf("Calculator Menu:\n");
        printf("1. Addition\n");
        printf("2. Subtraction\n");
        printf("3. Multiplication\n");
        printf("4. Division\n");
        printf("5. Exponentiation\n");
        printf("6. Square Root\n");
        printf("7. Exit\n");
        printf("Enter your choice (1-7): ");
        scanf("%d", &choice);

        if (choice >= 1 && choice <= 6) {
            printf("Enter two numbers: ");
            scanf("%lf %lf", &num1, &num2);
        }

        switch (choice) {
```

```
        case 1:
            result = add(num1, num2);
            break;
        case 2:
            result = subtract(num1, num2);
            break;
        case 3:
            result = multiply(num1, num2);
            break;
        case 4:
            result = divide(num1, num2);
            break;
        case 5:
            result = power(num1, num2);
            break;
        case 6:
            result = squareRoot(num1);
            break;
        case 7:
            printf("Exiting the calculator. Goodbye!\n");
            return 0;
        default:
```

```
                printf("Invalid choice. Please enter a number between 1
                    and 7.\n");
                continue;  // Skip the rest of the loop and show the
                    menu again
        }

        printf("Result: %.2lf\n", result);

    } while (1);  // Infinite loop until the user chooses to exit

    return 0;
}
```

```
Calculator Menu:
1. Addition
2. Subtraction
3. Multiplication
4. Division
5. Exponentiation
6. Square Root
7. Exit
Enter your choice (1-7): 1
Enter two numbers: 5 3
Result: 8.00
```

```
Calculator Menu:
1. Addition
2. Subtraction
3. Multiplication
4. Division
5. Exponentiation
6. Square Root
7. Exit
Enter your choice (1-7): 5
Enter two numbers: 2 ^ 3
Result: 8.00
```