LAB6 – Arrays
Exercise

- Write a program to define and initialize the following two integer arrays.

X : 10, 20, 30, 40, 50

Y : 5, 15, 7, 25, 8

- Define the float Z array and compute its corresponding values according to the expression below.

Z = $\cos^2(X) + 3Y$

- Display the Z array on screen.
(Square calculation should be scalar, not linear algebra.)

LAB6 – Arrays
Exercise 1

- The Nth degree polynomial is written as:

$P(X) = C_N X^N + C_{N-1}X^{N-1} + C_{N-2}X^{N-2} + \ldots + C_1X^1 + C_0X^0$

(C : Coefficients , X : Base variable)

- **Write a C program to do followings.**
- Define an integer array of Coefficients for a polynomial.
- Initialize the array with coefficients values given below.

$$P(x) = 7x^5 - x^4 + 6x^2 + 3x - 5$$

- By looping through the coefficients array, display the polynomial on screen in simple notation as shown below.

Example screen output:

```
P(x) =  +7x^5  -1x^4  +0x^3  +6x^2  +3x^1  -5x^0
```


Exercise 2

DISPLAY_POLYNOMIAL FUNCTION

- Prototype :

void display_polynomial (int Coef[], int Degree);

- Function takes a Coefficients array and its Degree.
- Function should display the polynomial on screen in simple notation.

MAIN PROGRAM

- Call the above function to display the polynomial on screen.
- (Pass the Coefficients array and its Degree to the function.)

Exercise 3

EVALUATE_POLYNOMIAL FUNCTION

- Prototype :

int Evaluate_polynomial (int Coef[], int Degree, int Value);

- Function takes a Coefficients array, its Degree, and a value for evaluating.
- Function should calculate the sum of terms in polynomial, and return the result.

MAIN PROGRAM

- Ask user to enter a numeric value for X variable.
- Call the above function to calculate the P(X=value).
- Display the result on screen.

Example screen output:

```
Enter an X value for evaluation : 1
P(x=1) = 10
```


Exercise 4

DERIVATIVE_POLYNOMIAL FUNCTION

- Prototype :

void Derivative_polynomial (int Coef[], int Degree, int DerCoef[]) ;

- **Input arguments:** Coefficients array and Degree of Original polynomial.
- **Output argument:** Coefficients array of Derivative polynomial.
- Function should calculate the coefficients of terms for the Derivative polynomial.

MAIN PROGRAM

- Define a Coefficients array for Derivative polynomial.
- Call the above function.
- Call the **display_polynomial()** function to display the derivated polynomial on screen.

Example screen output:

```
P'(x) =  +35x^4  -4x^3  +0x^2  +12x^1  +3x^0
```


Exercise 5

- Modify the **DISPLAY_POLYNOMIAL** function.
- So that the polynomial is displayed in **mathematical notation** on screen as shown below.

Example screen output:

```
P(x) = 7x^5 - x^4 + 6x^2 + 3x - 5
```

MATHEMATICAL NOTATION RULES

1. Highest degree term is displayed first.
   Example: `7x^5` is displayed at leftmost.

2. If coefficient of a term is zero, term is not displayed.
   Example: `0x^2` is not displayed entirely.

3. If coefficient is 1, coefficient is not displayed.
   (Last coefficient must be displayed).
   Example: `1x^4` is displayed as `x^4` .

4. If exponent is 1, exponent is not displayed.
   Example: `3x^1` is displayed as `3x` .

5. If exponent is 0, only the coefficient is displayed.
   Example: `5x^0` is displayed as `5` .

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