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Optimization Techniques and Algorithms Assignment 1

Questions:

Q1. Create a 5*6 matix and:

i) Print the sum of all rows

ii) Print the sum of all columns

iii) Print the sum of all elements of the matrix

Q2. Write a Matlab program to print factorial of a number.

Q3. Use switch case and print the grades for a given score as per the following criterion:

Score	Grade
0 – 39	F
40 – 59	C
60 – 79	B
80 – 100	A

Q4. Write a Matlab program that passes two numbers (a and b) as arguments to a function and the function returns two values pow(a,b) and pow(b,a).

Assigment Code:

5*6 Matrix:

mat=[1 2 3 4 5 6; 2 3 4 5 6 7; 3 4 5 6 7 8; 4 5 6 7 8 9; 5 6 7 8 9 10]

Code 1:

```
%Sum of every row
for i=1:5
   sum_row=0;
   for j=1:6
      sum_row=sum_row+mat(i, j);
   end
```

```
    fprintf("Sum of row %d: %d\n", i, sum_row);
end
```

Code 2:

```
%Sum of every column
for i=1:6
    sum_column=0;
    for j=1:5
        sum_column=sum_column+mat(j, i);
    end
    fprintf("Sum of column %d: %d\n", i, sum_column);
end
```

Code 3:

```
%Sum of all elements
sum_mat=0;
for i=1:5
    for j=1:6
        sum_mat=sum_mat+mat(i, j);
    end
end
fprintf("Sum of matrix: %d\n", sum_mat);
```

Code 4:

```
%Calculate Factorial
function result = factorial(n)
    if n < 0 || floor(n) ~= n
        error('Input must be a non-negative integer.');
    end
```

```
    result = 1;

    for i = 1:n
        result = result * i;
    end
end
```

Code 5:

```
%Calculate grade using switch case
prompt = 'Enter marks to know grade: ';
grade = input(prompt);
switch true
    case grade >= 80 && grade <= 100
        fprintf('Your grade for %d marks is: A\n', grade);
    case grade >= 60 && grade <= 79
        fprintf('Your grade for %d marks is: B\n', grade);
    case grade >= 40 && grade <= 59
        fprintf('Your grade for %d marks is: C\n', grade);
    case grade >= 0 && grade < 40
        fprintf('Your grade for %d marks is: F\n', grade);
    otherwise
        fprintf('Invalid input. Marks should be between 0 and 100.\n');
end
```

Code 6:

```
%Calculate power
function [result1, result2] = pow(a, b)
    result1 = a^b;

    result2 = b^a;
```

```
end
[result1, result2] = pow(4, 6);
fprintf('result1 (a^b) = %f\n', result1);
fprintf('result2 (b^a) = %f\n', result2);
```

Assignment Outputs:

5*6 Matrix:

```
>> Assignment1

mat =

     1     2     3     4     5     6
     2     3     4     5     6     7
     3     4     5     6     7     8
     4     5     6     7     8     9
     5     6     7     8     9    10
```

Code 1:

```
Sum of row 1: 21
Sum of row 2: 27
Sum of row 3: 33
Sum of row 4: 39
Sum of row 5: 45
```

Code 2:

```
Sum of column 1: 15
Sum of column 2: 20
Sum of column 3: 25
Sum of column 4: 30
Sum of column 5: 35
Sum of column 6: 40
```

Code 3:

```
Sum of matrix: 165
```

Code 4:

```
The factorial of 6 is 720.
```

Code 5:

```
Enter marks to know grade:
78
Your grade for 78 marks is: B
```

Code 6:

```
result1 (a^b) = 4096.000000
result2 (b^a) = 1296.000000
```