

Lab Session 04

Exercise a:

CODE

```
def matMul(A, B, n):  
    C = []  
    for i in range(n):  
        C.append([])  
        for j in range(n):  
            C[i].append(0)  
  
    for i in range(n):  
        for j in range(n):  
            C[i][j] = 0  
            for k in range(n):  
                C[i][j] = C[i][j] + A[i][k]*B[k][j]  
  
    return C
```

```
A = [[1, 2], [3, 4]]  
B = [[5, 6], [7, 8]]  
n = len(A)  
C = matMul(A, B, n)  
  
print("New Matric C:")  
for row in C:  
    print(row)
```

OUTPUT

```
New Matric C:  
[19, 22]  
[43, 50]
```

Exercise b:

CODE

```
def matMul(A, B, cA, rB):  
  
    if cA != rB:  
        return "Column of A and Row of B do not match"  
  
    C = []  
    for i in range(len(A)):  
        C.append([])  
        for j in range(len(B[0])):  
            C[i].append(0)  
  
    for i in range(len(A)):  
        for j in range(len(B[0])):  
            C[i][j] = 0  
            for k in range(len(A[0])):  
                C[i][j] = C[i][j] + A[i][k]*B[k][j]  
  
    return C
```

```
A = [[1, 2], [3, 4], [5, 6]]  
B = [[7, 8, 9], [10, 11, 12]]  
  
cA = len(A[0])  
rB = len(B)  
C = matMul(A, B, cA, rB)  
  
print("New Matric C:")  
for row in C:  
    print(row)
```

OUTPUT

```
New Matric C:  
[27, 30, 33]  
[61, 68, 75]  
[95, 106, 117]
```

Exercise c:

CODE

```
import numpy as np  
from timeit import timeit  
  
def matMul(A, B, cA, rB):  
  
    if cA != rB:  
        return "Column of A and Row of B do not match"  
  
    C = []  
    for i in range(len(A)):  
        C.append([])  
        for j in range(len(B[0])):  
            C[i].append(0)  
  
    for i in range(len(A)):  
        for j in range(len(B[0])):  
            C[i][j] = 0  
            for k in range(len(A[0])):  
                C[i][j] = C[i][j] + A[i][k]*B[k][j]  
  
    return C
```

```
def func1():  
  
    A = [[1, 2], [3, 4], [5, 6]]  
    B = [[7, 8, 9], [10, 11, 12]]  
  
    cA = len(A[0])  
    rB = len(B)  
    matMul(A, B, cA, rB)  
  
def func2():  
    A = np.array([[1, 2], [3, 4], [5, 6]])  
    B = np.array([[7, 8, 9], [10, 11, 12]])  
    C = np.dot(A, B)  
  
execution_matmul = timeit(func1, number=10000)  
print(f"\nExecution time for matMul() function: {execution_matmul} seconds")  
  
execution_np = timeit(func2, number=10000)  
print(f"Execution time np.dot() function: {execution_np} seconds")  
  
difference = execution_matmul - execution_np  
print(f'Difference (User - Python): {difference} seconds')
```

OUTPUT

```
Execution time for matMul() function: 0.1327799 seconds  
Execution time np.dot() function: 0.042762499999999998 seconds  
Difference (User - Python): 0.090017400000000003 seconds
```