**Algorithmics Unit 4 Week 4 Submit Task**

1. Use the master theorem to find the time complexity of the following recurrence relations:

(a)

A=3

B=2

F(n)=5n^2

Logb(A)=log2(3)=1.58496

Log2(3)<2 hence O(n^2)

(b)

A=8

B=2

F(n)=n+n^3

Log2(8)=3

T(n)=O(n^3logn)

(c)

A=5

B=4

F(n)=5n

Log2(5)=2.32193

1<log2(5) hence t(n)=O(n^(log2(5)))

1. An algorithm takes a matrix of size n x n and divides it into four matrices of size n/2 x n/2. These matrices are then recursively multiplied using the following standard approach:

Assume that n is a positive power of 2, and that addition/multiplication of integers can be done in constant time.

Use the Master Theorem to show that the time complexity of this algorithm is O(n3).

T(n)=8T(n/2)+O(n^2)

1=8

B=2

F(n)=O(n^2)

Log2(8)=3

As 2<3, it fits case one of MT:

T(n)=O(n^(logb(a)))=O(n^3)