Find the time complexity of the below functions in Θ form. Write NA if the function does not

apply to any case.

a) T (n) = 3T (n/2) + n

b) T (n) = 64T (n/8) − n^2(log n)

c) T (n) = 2nT (n/2) + n^n

d) T (n) = 3T (n/3) + n/2

e) T (n) = 7T (n/3) + n^2

**Maters theorem Cases:**

1. If f(n) = O(nlogb a-ϵ), then T(n) = Θ(nlogb a).

2. If f(n) = Θ(nlogb a), then T(n) = Θ(nlogb a \* log n).

3. If f(n) = Ω(nlogb a+ϵ), then T(n) = Θ(f(n)).

Where ϵ is a constant > 0.

a>=1, b>1, c>0

1. T (n) = 3T (n/2) + n

a = 3, b = 2, f(n) = n^1

T(n) = Θ(n^log3base 2) hence case 3 is applicable

1. T (n) = 64T (n/8) − n^2(log n)

a = 64=8^2, b = 8, f(n) = n^2( log n)

T(n)= Θ(n^2logn^2) case 2

1. T (n) = 2nT (n/2) + n^n

a = 2, b = 2, d = n where n^d = n^n

a>b^d.

Therefore T(n) = Θ(n^log2base2)

= Θ(n) case 3

1. T (n) = 3T (n/3) + n/2

a = 3, b= 3, f(n) = n/2,

a=b^d where d=1

Therefore T(n) = Θ(nlogn) case 2

1. T (n) = 7T (n/3) + n^2

a = 7, b = 3, f(n)=n^2,

a<b^d where d = 2

Therefore T(n) = Θ(n^2) case 1