Find the time complexity of the below functions in **Θ** form. Write NA if the function does not apply to any case.

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

Sol: Applying Master’s Theorem,

a = 3, b = 2, d= 1

Since 3>, case 3 applies , T(n) = Θ(nlog a {base b}) = Θ(nlog 3 {base 2})

**b) T (n) = 64T (n/8) − n^2(log n)**

Sol: Applying Master’s Theorem,

a = 64, b = 8, d = 2

Since 64 = , case 2 applies , T(n) = Θ( log n) = Θ( log n)

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

Sol: Applying Master’s Theorem,

a = 2n, b = 2, d = 2

Case 1: For n=1(a=2); since 2 < , case 1 applies , T(n) = Θ() = Θ()

Case 2: For n=2(a=4); since 4 = , case 2 applies , T(n) = Θ( log n) = Θ( logn)

Case 3: For n>2; since 2n>,case 3 applies , T(n) = Θ(nlog a {base b}) = Θ(nlog 2n {base 2})

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

Sol: Applying Master’s Theorem,

a = 3, b = 3, d= 1

Since 3 = , case 2 applies , T(n) = Θ( log n) = Θ(n.log n)

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

Sol: Applying Master’s Theorem,

a = 7, b = 3, d= 2

Since 7 < , case 1 applies , T(n) = Θ() = Θ()