JOHN HARSHITH ALGORITHMS ASSIGNMENT PART-I
JOHN HARSHITH MASTER THEOREM SOLUTION

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

here a = 3, b = 2, d = 1

- ⇨ b^d = 2^1 = 2
- ⇨ hence, a > (b^d)
- ⇨ Θ(n^loga[base b])
- ⇨ **Θ(n^log3[base 2])**

b) T (n) = 64T (n/8) − n^2(log n)

here a = 64, b = 8

but here f(n) which is the combination time is not positive hence, the above equation cannot be solved using the master theorem

- ⇨ **NA**

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

here b = 2

but here a is not a constant which means the number of subproblems is not fixed

hence, the above equation cannot be solved using the master theorem

- ⇨ **NA**

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

here a = 3, b = 3, d = 1

- ⇨ b^d = 3^1 = 3
- ⇨ hence, a = (b^d)
- ⇨ Θ(n^d logn)
- ⇨ **Θ(n logn)**

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

here a = 7, b = 3, d = 2

- ⇨ b^d = 3^2 = 6
- ⇨ hence, a > (b^d)
- ⇨ Θ(n^loga[base b])
- ⇨ **Θ(n^log7[base 3])**