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Quiz (10)

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QUESTION 9 5 marks

The recurrence relation

```
T(1) = 2

T(n) = 3T(n/4)+n
```

has the solution, T(n) equals to

- O(n)
- O(log n)
- O(n^3/4)
- None of the above

Your submitted response was correct.

Explanation

As the recurrence equation is given:
= 3 (3t(n/4^2)+ n/4) +n

= 3^2t(n/4^2) + n(1+3/4)

= 3^2(3t(n/4^3) +n/4^2) + n(1+3/4)

= 3^3t(n/4^3) + n(1+3/4 + 3^2/4^2)

= 3^it(n/4^i) + n(1+3/4 + 3^2/4^2 + ...+3^(i-1)/4^(i-1))

we will stop at i = log4n, n/4^i = 1

Therefore,

t(n) = 3^ log4nt(1) +n . Σ(k-= to log4 n-1) (3/4)^k

<= 3log4n. Θ(1) + n Σ(k= 0 to infinity) (3/4)^k = Θn^log4(3)+4n = o(n)+4n

t(n) = O(n)

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