

# 기초 수식

함께 학습하고 고민하고 설명하며 작은 부분 하나라도 '내 것'으로 만들어보세요. 😊

## 2 번

- 문제 2:  $T(n) = T(n-1) + n$        $T(n-1) = T(n-2) + n-1$   
 $= T(n-2) + (n-1) + n$

•  $T(0) = 1$ 로 설정하고 진행

$$= T(n-3) + (n-2) + (n-1) + n$$

$$= T(1) + \cancel{\dots} + (n-3) + (n-2) + \cancel{(n-1)} + n$$

$$= O(n^2) \quad \therefore O(n^2)$$

## 4 번

- 문제 4:  $T(n) = T\left(\frac{n}{2}\right) + 1$        $T\left(\frac{n}{4}\right) = T\left(\frac{n}{8}\right) + 1$

•  $T(1) = 1$ 로 설정하고 진행

$$T\left(\frac{n}{2}\right) = T\left(\frac{n}{4}\right) + 1$$

$$T(1) = T\left(\frac{1}{2}\right) + 1$$

$$T(n) = T\left(\frac{n}{4}\right) + 1 + 1$$

$$T(n) = T\left(\frac{n}{8}\right) + 1 + 1 + 1 \quad \frac{n}{2^k} = 1$$

$$T(n) = T\left(\frac{n}{2^k}\right) + k$$

$$n = 2^k$$

$$k = \log n$$

## 6 번

- 문제 6:  $T(n) = 2T\left(\frac{n}{2}\right) + n$

$$T\left(\frac{n}{2}\right) = 2T\left(\frac{n}{4}\right) + \frac{n}{2}$$

$$T\left(\frac{n}{4}\right) = 2T\left(\frac{n}{8}\right) + \frac{n}{4}$$

$$T(n) = 2^2 T\left(\frac{n}{4}\right) + \frac{n}{2} + n$$

$$= 2^3 T\left(\frac{n}{8}\right) + \frac{n}{4} + \frac{n}{2} + n$$

$$= 2^k T\left(\frac{n}{2^k}\right) + n \sum_{i=1}^k \frac{1}{2^i}$$

$$\therefore O(n \log n)$$

## 8 번

- 문제 8:  $T(n) = T(n-1) + \frac{1}{n}$

$$T(n-1) = T(n-2) + \frac{1}{n-1}$$

$$T(n) = T(n-3) + \frac{1}{n-2} + \frac{1}{n-1} + \frac{1}{n}$$

$$= T(1) + \frac{1}{1} + \dots + \frac{1}{n-2} + \frac{1}{n-1} + \frac{1}{n} = \ln(n) + c$$

$$\therefore O(\log n)$$

## 참고 자료

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<https://www.radford.edu/~nokie/classes/360/recurrence.eqns.revised.html>