이차함수 함숫값 찾기

- 증가량(t) 공식

$f''(x) = h, \quad f(n) = a, \quad f(m) = b \quad (m-n > 1)$

$f(n+1) - f(n) = t$

$b = a + (m-n)t + \sum_{i=1}^{m-n-1} h_i$

$(m-n)t = b-a - \sum_{i=1}^{m-n-1} h_i$

$t = \dfrac{b-a - \sum_{i=1}^{m-n-1} h_i}{m-n}$

ex. 1)

$f(x) = 2x^2 + 5x$

$f''(x) = 4$

$f(2) = 18$

$f(4) = 52$

$t = \dfrac{52-18 - \sum_{i=1}^{4-2-1} 4i}{4-2} = \dfrac{34-4}{2} = 15 = f(3) - f(2)$

$f(2)$　$f(3)$　$f(4)$　$f(5)$　$f(6)$ $\cdots\cdots$

18　33　51　74　101 $\cdots$ $-$ $-$

$\underbrace{\qquad}$　$\underbrace{\qquad}$　$\underbrace{\qquad}$　$\underbrace{\qquad}$

15　19　23　27 $\cdots\cdots$

$\underbrace{\qquad}_{4}$　$\underbrace{\qquad}_{4}$　$\underbrace{\qquad}_{4}$ $\cdots\cdots$

ex.2)

$f(x) = 3x^2 + 5$

$f'(x) = 6$

$f(1) = 8$

$f(5) = 80$

$t = \dfrac{80 - 8 - \sum\limits_{i=1}^{5-1-1} 6i}{5-1} = \dfrac{72 - 36}{4}$

$= 9$

$= f(2) - f(1)$

$f(1)$ $f(2)$ $f(3)$ $f(4)$ $f(5)$ · · · ·

8   11   32   53   80

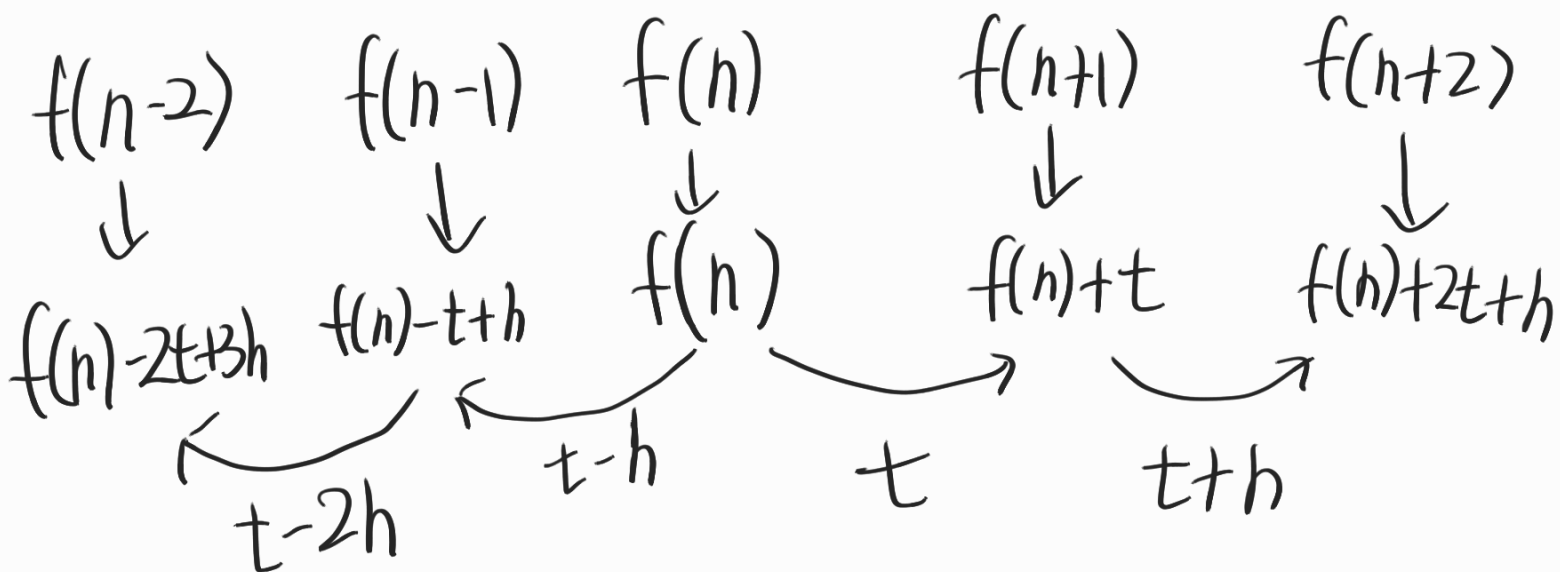9   15   21   27 · · · · ·

6   6   6 · · · · ·

이것도 함수와 두 개의 함숫값을
알고 있으면 쉽게 다른 함숫값도 찾을 수 있음.

— 함숫값 공식

$$f''(x) = h, \quad f(n) = a, \quad t = f(n+1) - f(n)$$

$$f(x) = a + (x-n)t + \sum_{i=1}^{|m-n-1|} hi \quad (x > n)$$

$$f(x) = a + (x-n)t + \sum_{i=1}^{|m-n|} \quad (x < n)$$

$$f(n-2) \qquad f(n-1) \qquad f(n) \qquad f(n+1) \qquad f(n+2)$$
$$\downarrow \qquad\qquad \downarrow \qquad\qquad \downarrow \qquad\qquad \downarrow \qquad\qquad \downarrow$$
$$f(n)-2t+3h \quad f(n)-t+h \quad f(n) \quad f(n)+t \quad f(n)+2t+h$$

$$t-2h \qquad t-h \qquad t \qquad t+h$$

ex)

$f(x) = 2x^2 + 5x$

$f''(x) = 4$

$f(1) = 7$

$f(5) = 75$

$$t = \frac{b - a - \sum_{i=1}^{m-n-1} hi}{m-n} = \frac{75 - 7 - \sum_{i=1}^{5-1-1} 4i}{5-1} = \frac{68 - 24}{4} = 11$$

$$f(x) = a + (x-n)t + \sum_{i=1}^{|m-n-1|} hi \quad (x > n)$$

$$f(x) = a + (x-n)t + \sum_{i=1}^{|m-n|} hi \quad (x < n)$$

$$f(38) = 7 + (38-1)t + \sum_{i=1}^{|38-1-1|} 4i$$

$$= 7 + 37t + 2664$$

$$= 37 \times 11 + 2671$$

$$= 407 + 2671 = 3078$$