

LOGARITHMIC

25/10/18

LOG_b a

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

$$a=3$$

$$b=5$$

$$f(n)=n^2$$

$$\log_b a = \log_5 3 = 0.682$$

$$n^2 > n^{0.682} \rightarrow 2 > 0.682 \rightarrow \text{Case 3}$$

$$T(n) = \Theta(n^2)$$

$$\text{B) } T(n) = 4T\left(\frac{n}{2}\right) + 7n$$

$$a=4$$

$$b=3$$

$$f(n)=7n = \Theta(n)$$

$$\log_b a = \log_3 4 \approx 1.261$$

$$1 < 1.261 \rightarrow \text{Case 1}$$

$$T(n) = \Theta(n^{1.261})$$

$$\text{C) } T(n) = 5T\left(\frac{n}{4}\right) + 10$$

$$a=5$$

$$b=4$$

$$f(n)=10 = \Theta(1)$$

$$\log_b a = \log_4 5 \approx 1.161$$

$$0 < 1.161 \rightarrow \text{Case 1}$$

$$T(n) = \Theta(n^{1.161})$$

$$\text{D) } T(n) = 9T\left(\frac{n}{3}\right) + n^4$$

$$a=9$$

$$b=3$$

$$f(n)=n^4$$

$$\log_b a = \log_3 9 = 2$$

$$4 > 2 \rightarrow \text{Case 3}$$

$$T(n) = \Theta(n^4)$$

$$\text{E) } T(n) = 16T\left(\frac{n}{4}\right) + n^3$$

$$a=16$$

$$b=8$$

$$f(n)=n^3$$

$$\log_b a = \log_8 16 = 0.9$$

case 1: $\Theta(n^c)$ where $c < \log_b a$

case 2: $\Theta(n^c)$ where $c = \log_b a$

case 3: $\Theta(n^c)$ where $c > \log_b a$