

Lab 7

1. $T(n) = T(\frac{n}{2}) + n^2$ $a=1$ $b=2$ $d=2$

$$T(n) = \underset{\uparrow a}{1} T(\underset{\uparrow b}{\frac{n}{2}}) + \underset{\uparrow d}{n^2}$$

$$a < b^d$$

$$1 < 2^2, 1 < 4 \checkmark$$

$$\therefore \Theta(n^2)$$

2. $T(n) = 4T(\frac{n}{2}) + n^2$ $a=4$ $b=2$ $d=2$

$$a = b^d$$

$$4 = 2^2, 4 = 4 \checkmark$$

$$\therefore \Theta(n^2 \log n)$$

3. $T(n) = 3T(\frac{n}{3}) + \sqrt{n}$ $a=3$ $b=3$ $d=1/2$

$$a > b^d$$

$$3 > 3^{1/2}, 3 > \sqrt{3} \checkmark$$

$$\therefore \Theta(n^{\log_3 3}) = \Theta(n)$$

4. Recurrence: $T(n) = 2T(\frac{n}{2}) + n$

$$a=2$$
 $b=2$ $d=1$

$$a = b^d$$

$$2 = 2^1 \checkmark$$

Complexity: $\Theta(n \log n)$

5. Recurrence: $T(n) = T(\frac{n}{2}) + n^2$

$$a=1$$
 $b=2$ $d=2$

$$a < b^d$$

$$1 < 2^2, 1 < 4 \checkmark$$

Complexity: $\Theta(n^2)$