

$$(1) T(n) = T(n/2) + 1000n^2$$

$$T(n) = a T(n/b) + f(n)$$

$$a=8, \quad b=2, \quad f(n) = Cn^d$$

$$= 1000n^2$$

$$C=1000, \quad d=2$$

Since  $a > b^d$

$$\text{i.e. } 8 > 2^2$$

using master theorem

$$T(n) = \Theta(\cancel{n} \log b^a)$$

$$= \Theta(n \log_2 8)$$

$$= \Theta(n \log_2^{25}) = \Theta(n^3)$$

$$(2) T(n) = 2T(n/2) + n^2$$

$$a=2, \quad b=2, \quad c=1, \quad d=2$$

Since  $a < b^d$

$$2 < 2^2$$

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

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

$$(3) T(n) = 2T(n/2) + 10n$$

$$a=2, \quad b=2, \quad c=10, \quad d=1$$

Since

$$a = b^d$$

$$2 = 2^1$$

using master theorem

$$T(n) = \Theta(n^d \log a)$$

$$T(n) = \Theta(n \log n)$$

Teacher's Signature : \_\_\_\_\_