

# Assignment 3

$$T(n) = T(n/2) + T(n/3) + T(n/5) + c$$

$$\checkmark \quad n - c \rightarrow 3^0 c$$

$$\begin{array}{c} \swarrow \quad \searrow \\ n/2 \quad n/3 \quad n/5 \end{array} - 3c \rightarrow 3^1 c$$

$$\begin{array}{c} \swarrow \quad \searrow \quad \swarrow \quad \searrow \\ n/2 \quad n/3 \quad n/5 \quad n/2 \quad n/3 \quad n/5 \end{array} - 9c \rightarrow 3^2 c$$

$$\begin{array}{c} \swarrow \quad \searrow \quad \swarrow \quad \searrow \quad \swarrow \quad \searrow \\ n/2 \quad n/3 \quad n/5 \quad n/2 \quad n/3 \quad n/5 \quad n/2 \quad n/3 \quad n/5 \end{array} - 27c \rightarrow 3^3 c$$

$$\begin{array}{c} \swarrow \quad \searrow \quad \swarrow \quad \searrow \quad \swarrow \quad \searrow \quad \swarrow \quad \searrow \\ n/2^k \quad n/3^k \quad n/5^k \end{array} - 3^k c$$

largest  $k = \log_2 n$

$$[3^0 c + 3^1 c + 3^2 c + \dots + 3^k c]$$

$$\approx [3^0 + 3^1 + 3^2 + \dots + 3^k]$$

GP  $r = 3$ ,  $a = 1$ ,  $r > 1$

Sum of GP  $\frac{a(r^n - 1)}{r - 1} \Rightarrow \frac{1(3^{\log_2 n} - 1)}{3 - 1}$

$$= \frac{3^{\log_2 n} - 1}{2}$$

$$= O(n^{\log_2 3})$$