

# Assignment 1

1)  $i = n$

while  $i > 2$ :

$$i = i^{\frac{1}{25}}$$

print( $i$ )

Soln  $\rightarrow$  Here  $i = n$

we do repetition like

$$n^{\frac{1}{25}} \rightarrow n^{\frac{1}{25^2}} \rightarrow n^{\frac{1}{25^3}} \rightarrow n^{\frac{1}{25^k}}$$

$$n^{\frac{1}{25^k}} = 2 \rightarrow \text{stopping criteria}$$

Taking  $\log_2$

$$\log_2(n^{\frac{1}{25^k}}) = \log_2 2$$

$$\frac{1}{25^k} \log_2 n = 1 \Rightarrow$$

$$\log_2 n = 25^k$$

again taking  $\log_{25}$

$$\log_{25} \log_2 n = k \log_{25} 25$$

$$k = \log_{25}(\log_2 n)$$

So the time complexity is  $O(\log(\log n))$



2)

$$i = 29$$

while  $i < n$ :

$$i = i^{23}$$

print (i)

Soln:- Repeatedition will be like

$$(29)^{23} \rightarrow (29)^{23^2} \rightarrow (29)^{23^3} \rightarrow \dots \rightarrow (29)^{23^k}$$

$$(29)^{23^k} = n \rightarrow \text{stopping criteria}$$

Taking  $\log n$

$$\log_n 29^{23^k} = \log_n n$$

$$23^k \log_n 29 = 1$$

$$k = \log_{23} (\log_{29} n) \rightarrow O(\log \log n)$$

3)  $i = 1$

while  $i < n$ :

$$\left. \begin{array}{l} i = 2 \times i \\ i = 3 \times i \end{array} \right\} \rightarrow \text{Simplified } i = 6 \times i$$

$$\text{Soln:- } i = 6 \times i$$

$$i = 6 \times 6$$

$$i = 6 \times 36$$

simply it will be  $\Rightarrow \log_6 n$

$$O(\log n)$$