Time complexity (Apriori Analysis)

Example 6

```
main()
  i = n
  while (i > 2)
    i = i^1/2
```

$n = 256$ — 3 times

$n = 256$

$256 > 2$ — True

$i = (256)^{1/2}$

$= (2^8)^{1/2}$

$= 2^4 = 16$

$16 > 2$ — True

$i = (16)^{1/2} = (2^4)^{1/2}$

$= 2^2 = 4$

$4 > 2$ — True

$i = (4)^{1/2} = 2$

$2 > 2$ — False

$\log_a a = 1$

$\log_a n^b = b \log_a n$

$n^{1/2^k} = 2$

$\log_2 n^{1/2^k}$

$n^{1/2^k} = 2$

Log on both sides

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

$\log_2 n = 2^k$

$\log_2(\log_2 n) = k \log_2 2$

$\log_2(\log_2 n) = k$

i	
n	
$n^{1/2}$	
$(n^{1/2})^{1/2} = n^{1/2^2}$	
$((n^{1/2})^{1/2})^{1/2} = n^{1/2^3}$	
	k times
$n^{1/2^k}$	

$O(\log_2(\log_2 n))$

Example 1

```
main()
    i = n
    while( i > 2)
        i = i^(1/25)
```

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n — True

$n^{1/25}$ —

$(n^{1/25})^{1/25}$ —

$((n^{1/25})^{1/25})^{1/25}$ —

$O(\log_{25}(\log_2 n))$

$O(\log_{30}(\log_2 n))$

$n^{1/25^k} = 2$

$\log_2$ on both sides;

$\log_2 n^{1/25^k} = \log_2 1$

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

$\log_2 n = 25^k$

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

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

$O(\log_{25}(\log_2 n))$