

Base-2 Logarithms

If $n = 2^k$ then k is called the logarithm (base 2) of n

<u>k</u>	<u>$n=2^k$</u>	<u>$\log_{10}(n)$</u>	<u>binary rep. of n</u>
0	1	0	00000000000000000001
1	2	1	00000000000000000010
2	4	2	00000000000000000100
3	8	3	00000000000000001000
4	16	4	0000000000000010000
15	32768	15	01000000000000000000

(think: how many zeros following the “1”)

(better: how many divisions by 2 needed to get down to 1)

Some Rules

- $\log(\text{negative number}) = \text{undefined}$
- $\log(0) = \text{undefined}$ (or $-\infty$ if you like)
- $\log(1) = 0$ (in any base)
- $\log(1/k) = -1$ in base k
- $\log(a/b) = \log(a) - \log(b)$
- $\log(a*b) = \log(a) + \log(b)$
- $\log(a^b) = b*\log(a)$
- $\log_b(n) = \log_a(n)/\log_a(b)$ // switching bases

Base-10 Logarithms

If $n = 10^k$ then k is called the logarithm (base 10) of n

<u>k</u>	<u>$n = 10^k$</u>	<u>$\log_{10}(n)$</u>
0	1	0
1	10	1
2	100	2
3	1000	3
4	10000	4
12	10000000000000	12

(think: how many zeros following the “1”)

(better: how many divisions by 10 needed to get down to 1)