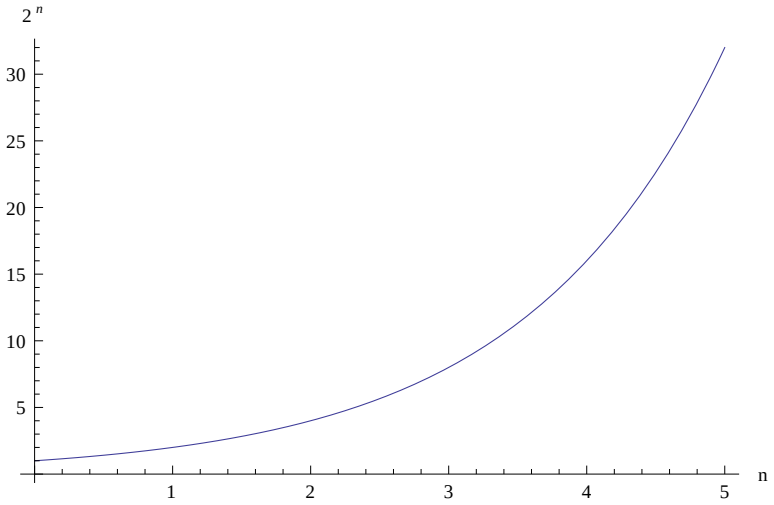
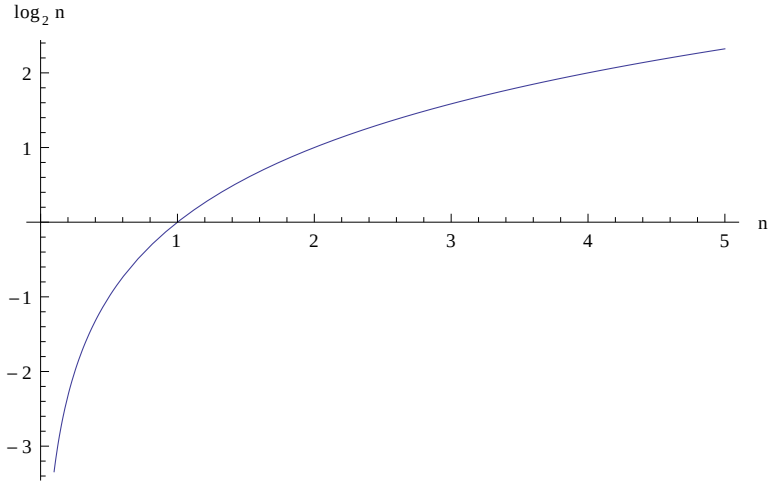
Proof of $\lfloor \log_2 n \rfloor + 1 = \lceil \log_2 (n+1) \rceil$

Function 2^n is an increasing function



$x < y \rightarrow 2^x < 2^y$ (* by definition of increasing function *)
$x \leq y \rightarrow 2^x \leq 2^y$ (* by definition of non-decreasing function *)

Function $\log_2 n$ is an increasing function



$x < y \rightarrow \log_2 x < \log_2 y$ (* by definition of increasing function *)
$x \leq y \rightarrow \log_2 x \leq \log_2 y$
(* by definition of non-decreasing function *)