

SOME USEFUL LIMITS

- (1) If $x > 0$, $\lim_{n \rightarrow \infty} x^{1/n} = 1$.
- (2) If $|x| < 1$, then $\lim_{n \rightarrow \infty} x^n = 0$.
- (3) For each $\alpha > 0$, $\lim_{n \rightarrow \infty} \frac{1}{n^\alpha} = 0$.
- (4) For each real x , $\lim_{n \rightarrow \infty} \frac{x^n}{n^\alpha} = 0$.
- (5) $\lim_{n \rightarrow \infty} \frac{\ln(n)}{n} = 0$.
- (6) $\lim_{n \rightarrow \infty} n^{1/n} = 1$.
- (7) $\lim_{n \rightarrow \infty} n \sin\left(\frac{1}{n}\right) = 1$ as $\lim_{x \rightarrow 0} \frac{\sin(x)}{x} = 1$.
- (8) $\lim_{n \rightarrow \infty} n \ln\left(1 + \frac{1}{n}\right) = 1$ as $\lim_{x \rightarrow 0} \frac{\ln(1+x)}{x} = 1$.
- (9) For each real x , $\lim_{n \rightarrow \infty} \left(1 + \frac{x}{n}\right)^n = e^x$.