

Exercício do Limite – Limite Exponencial

limite fundamental exponencial

$$a) \lim_{x \rightarrow +\infty} \left(1 + \frac{1}{x}\right)^{4x} = \lim_{x \rightarrow +\infty} \left[\left(1 + \frac{1}{x}\right)^x \right]^4 = e^4$$

$$b) \lim_{x \rightarrow +\infty} \left(1 + \frac{1}{x}\right)^{\frac{x}{7}} = \lim_{x \rightarrow +\infty} \left(1 + \frac{1}{x}\right)^{\frac{1}{7} \cdot x} =$$

$$\lim_{x \rightarrow +\infty} \left[\left(1 + \frac{1}{x}\right)^x \right]^{\frac{1}{7}} = \left[\lim_{x \rightarrow +\infty} \left(1 + \frac{1}{x}\right)^x \right]^{\frac{1}{7}} =$$

$$e^{\frac{1}{7}} = \sqrt[7]{e}$$

$$c) \lim_{x \rightarrow -\infty} \left(1 + \frac{1}{5x}\right)^x = \lim_{u \rightarrow -\infty} \left(1 + \frac{1}{u}\right)^{u/5} =$$

$$\lim_{u \rightarrow -\infty} \left(1 + \frac{1}{u}\right)^{u \cdot \frac{1}{5}} = \lim_{u \rightarrow -\infty} \left[\left(1 + \frac{1}{u}\right)^u \right]^{\frac{1}{5}} =$$

$$e^{\frac{1}{5}} = \sqrt[5]{e}$$

$$d) \lim_{x \rightarrow +\infty} \left(1 + \frac{1}{x}\right)^{x+2} = \lim_{x \rightarrow +\infty} \left(1 + \frac{1}{x}\right)^x \cdot \left(1 + \frac{1}{x}\right)^2 =$$

$$\underbrace{\lim_{x \rightarrow +\infty} \left(1 + \frac{1}{x}\right)^x}_e \cdot \lim_{x \rightarrow +\infty} \left(1 + \frac{1}{x}\right)^2 =$$

$$e \cdot \left(1 + \frac{1}{\infty}\right)^2 = e \cdot (1+0)^2 = e \cdot 1 = e$$

$$\lim_{x \rightarrow +\infty} \left(1 + \frac{1}{x}\right)^{x+2} = e$$

$$e) \lim_{x \rightarrow +\infty} \left(1 + \frac{1}{x}\right)^{x+k} = \lim_{x \rightarrow +\infty} \left(1 + \frac{1}{x}\right)^x$$

$$\lim_{x \rightarrow +\infty} \left(1 + \frac{1}{x}\right)^x = e \cdot \left(1 + \frac{1}{x}\right)^k = e \cdot (1+0) =$$

$$e \cdot 1 = e$$

$$f) \lim_{x \rightarrow \infty} \left(1+x\right)^{\frac{1}{x}u} = \lim_{u \rightarrow \infty} \left(1+\frac{1}{u}\right)^u = e$$