(1^{∞}) INDETERMINACIÓN

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

$$\lim_{x\to\square} f(x)^{g(x)}=\lim_{x\to\square} f(x)^{\lim g(x)}$$

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a) $\lim\limits_{x\to+\infty}\left(1+\frac{1}{5x}\right)^{x}=(1^{\infty})$ IND.

$$\boxed{\lim_{x\to+\infty}\left(1+\frac{1}{5x}\right)^{x\cdot 5\cdot\frac{1}{5}}} = \lim_{x\to+\infty}\left[\left(1+\frac{1}{5x}\right)^{5x}\right]^{1/5} = e^{1/5}$$

b) $\lim\limits_{x\to+\infty}\left(5+\frac{1}{5x}\right)^{5x}=(1^{\infty})$

$$\lim_{x\to+\infty}\left[5\left(1+\frac{1}{25x}\right)\right]^{5x}=\lim_{x\to+\infty}5^{5x}\left(1+\frac{1}{25x}\right)^{5x}=$$

$$=\lim_{x\to+\infty}5^{5x}\left(1+\frac{1}{25x}\right)^{5x\cdot 5\cdot\frac{1}{5}}=\lim_{x\to+\infty}5^{5x}\left[\left(1+\frac{1}{25x}\right)^{25x}\right]^{1/5}=$$

$$=\lim_{x\to+\infty}5^{5x}\cdot\lim_{x\to+\infty}\left[\left(1+\frac{1}{25x}\right)^{25x}\right]^{1/5}=$$

$$=+\infty\cdot e^{1/5}=+\infty$$

c) $\lim\limits_{x\to+\infty}\left(5+\frac{1}{5x}\right)^{-5x}=\lim\limits_{x\to+\infty}\left[5\left(1+\frac{1}{25x}\right)\right]^{-5x}=$

$$=\lim_{x\to+\infty}5^{-5x}\cdot\left(1+\frac{1}{25x}\right)^{\frac{-5x\cdot-5}{-5}}=\lim_{x\to+\infty}5^{-5x}\cdot\left[\left(1+\frac{1}{25x}\right)^{25x}\right]^{1/-5}$$

$$=0\cdot e^{-1/5}=0$$

$$\lim_{x\to+\infty}5^{-5x}=5^{-\infty}=\frac{1}{5^{\infty}}=0$$

d) $\lim_{x \to +\infty} \left(1+\frac{1}{5x}\right)^{5} = 1^{5} = \underline{\underline{1}}$

e) $\lim_{x \to +\infty} \left(1+\frac{5}{x}\right)^{x} = 1^{\infty}$

$\lim_{x \to +\infty} \left(1+\frac{1}{x/5}\right)^{x} = \boxed{\lim_{x \to +\infty} \left(1+\frac{1}{x/5}\right)^{x \cdot \frac{1}{5}}}^{5} = e^{5}$

f) $\lim_{x \to +\infty} \left(1+\frac{5}{x}\right)^{-x} = (1^{-\infty})$

$\lim_{x \to +\infty} \left(1+\frac{1}{x/5}\right)^{-x \frac{1}{(-5)} \cdot (-5)} = \lim_{x \to +\infty} \left[\left(1+\frac{1}{x/5}\right)^{x/5}\right]^{-5} = \underline{\underline{e^{-5}}}$

g) $\lim_{x \to +\infty} \left(5+\frac{5}{x}\right)^{5x} = 5^{+\infty} = \underline{\underline{+\infty}}$

EDO $\lim_{x \to +\infty} \left[5\left(1+\frac{1}{x}\right)\right]^{5x} = \lim_{x \to +\infty} \underbrace{5^{5x}}_{5^{\infty}} \cdot \underbrace{\boxed{\left(1+\frac{1}{x}\right)^{x \cdot 5}}}_{e^{5}}$

$= 5^{\infty} \cdot e^{5} = +\infty \cdot e^{5} = \underline{\underline{+\infty}}$

h) $\lim_{x \to +\infty} \left(1-\frac{1}{x}\right)^{5x} = (1^{\infty})$

$\lim_{x \to +\infty} \left(1+\frac{1}{-x}\right)^{5x} = \lim_{x \to +\infty} \boxed{\left(1+\frac{1}{-x}\right)^{-x}}^{(-5)} = \underline{\underline{e^{-5}}}$

i) $\lim_{x \to +\infty} \left(1-\frac{1}{x}\right)^{-5x} = (1^{-\infty})$

$\lim_{x \to +\infty} \left(1+\frac{1}{-x}\right)^{-x \cdot 5} = \underline{\underline{e^{5}}}$

216.or) $\boxed{4}$ (1^{∞})

a) $\lim_{x \to +\infty} \left(1+\frac{1}{x}\right)^{3x-2} = (1^{+\infty})$

$\lim_{x \to +\infty} \left(1+\frac{1}{x}\right)^{3x} \cdot \left(1+\frac{1}{x}\right)^{-2} = e^{3} \cdot 1^{-2} = e^{3}$

b) $\lim_{x \to +\infty} \left(1-\frac{1}{2x}\right)^{4x} = (1^{+\infty})$

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

c) $\lim_{x \to +\infty} \left(1+\frac{1}{5x}\right)^{3x} = (1^{+\infty})$

$= \lim_{x \to +\infty} \left(1+\frac{1}{5x}\right)^{3x \cdot \frac{5}{5}} = e^{3/5}$

d) $\lim_{x \to +\infty} \left(1+\frac{3}{2x}\right)^{5} = 1^{5} = 1$

e) $\lim_{x \to +\infty} \left(1-\frac{1}{2x}\right)^{3x} = (1^{+\infty})$

$\lim_{x \to +\infty} \left(1+\frac{1}{-2x}\right)^{3x \cdot \frac{-1}{2}} = e^{3/2}$

f) $\lim_{x \to +\infty} \left(1+\frac{2}{5x}\right)^{5x} = (1^{+\infty})$

$\lim_{x \to +\infty} \left(1+\frac{1}{5x/2}\right)^{5x \cdot \frac{2}{2}} = e^{2}$