

Ejercicio 1. Calcular los siguientes límites, resolviendo las indeterminaciones en los casos que sea necesario:

1) $\lim_{x \rightarrow +\infty} \frac{4-2x}{x-2}$

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

3) $\lim_{x \rightarrow 2} \frac{x^2 - x - 2}{x^2 - 2x}$

4) $\lim_{x \rightarrow 1} \frac{x^2 - 4x + 3}{x^2 + x - 2}$

5) $\lim_{x \rightarrow 4} \frac{x^2 - 8x + 16}{x^2 - 16}$

6) $\lim_{x \rightarrow 2^+} \frac{2 - \sqrt{x+2}}{x-2}$

7) $\lim_{x \rightarrow 1} \frac{\sqrt{x-1}}{x^2 - 1}$

8) $\lim_{x \rightarrow +\infty} \frac{3 - \sqrt{x-2}}{\sqrt{2x+1}}$

9) $\lim_{x \rightarrow +\infty} \left(\frac{2x-1}{3x+2} \right)^x$

10) $\lim_{x \rightarrow 3} \left(\frac{2x}{x^2-9} - \frac{1}{x-3} \right)$

11) $\lim_{x \rightarrow +\infty} \left(\frac{x^2-1}{x+2} - \frac{x^3}{x^2+1} \right)$

12) $\lim_{x \rightarrow +\infty} \left(2 - \frac{1}{x^2+1} \right)^{3-x}$

13) $\lim_{x \rightarrow 0} \frac{3x}{\sqrt{x+4} - 2}$

14) $\lim_{x \rightarrow +\infty} \frac{3x+2}{\sqrt{x^2-3x+1}}$

15) $\lim_{x \rightarrow +\infty} (\sqrt{x^2-3x} - 2x)$

16) $\lim_{x \rightarrow +\infty} \left(\frac{4x-2}{3x+5} \right)^{x^2+1}$

17) $\lim_{x \rightarrow 2} \frac{2x^2 + x - 10}{x^2 + x - 6}$

18) $\lim_{x \rightarrow +\infty} (\sqrt{x-3} - \sqrt{x+1})$

19) $\lim_{x \rightarrow 2} \frac{\sqrt{x^2-4}}{\sqrt[3]{x-2}}$

20) $\lim_{x \rightarrow 1} \frac{x^3 - 3x + 2}{x^3 - 1}$

21) $\lim_{x \rightarrow -\infty} \frac{x^2 + 2x - 1}{\sqrt{1-x^3}}$

22) $\lim_{x \rightarrow +\infty} \frac{5x-2}{\sqrt{x^3+2x}}$

23) $\lim_{x \rightarrow 3} \frac{x^2 + x - 12}{x^3 - 27}$

24) $\lim_{x \rightarrow 2} \frac{x-2}{\sqrt{x-1}-1}$

25) $\lim_{x \rightarrow 1^-} \frac{3x+2}{x^2-1}$

26) $\lim_{x \rightarrow 1} \frac{x^3 - x^2 - x + 1}{x^3 - x}$

Ejercicio 2. Calcula el valor de a para que exista el límite en $x = 1$ de la función $f(x)$

$$f(x) = \begin{cases} 2^x + a & \text{si } x \leq 1 \\ x^2 - 3a + 5 & \text{si } x > 1 \end{cases}$$

Ejercicio 3. Calcula el valor de m para que se verifique:

$$\lim_{x \rightarrow 3} \frac{x^2 - 2x - 3}{x^2 + mx + 3} = 2$$

Ejercicio 4. Hallar los siguientes límites del tipo del número e

$$1) \lim_{x \rightarrow +\infty} \left(1 + \frac{7}{x}\right)^{2x+3}$$

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

$$3) \lim_{x \rightarrow +\infty} \left(1 + \frac{4}{x^2}\right)^{x-4}$$

$$4) \lim_{x \rightarrow +\infty} \left(1 + \frac{6}{x}\right)^{x+2}$$

$$5) \lim_{x \rightarrow +\infty} \left(1 - \frac{x}{x^2-1}\right)^{x^2}$$

$$6) \lim_{x \rightarrow +\infty} \left(1 + \frac{3}{x^2}\right)^{-2x}$$

$$7) \lim_{x \rightarrow +\infty} \left(1 + \frac{x+1}{x}\right)^{2x^2+1}$$

$$8) \lim_{x \rightarrow +\infty} \left(1 + \frac{3x-1}{2x}\right)^{2x-1}$$

$$9) \lim_{x \rightarrow +\infty} \left(\frac{x+2}{x-3}\right)^x$$

$$10) \lim_{x \rightarrow +\infty} \left(\frac{x+7}{x+2}\right)^{x+2}$$

$$11) \lim_{x \rightarrow +\infty} \left(\frac{x+1}{x}\right)^{\frac{x}{3}+1}$$

$$12) \lim_{x \rightarrow +\infty} \left(\frac{x+1}{x-2}\right)^{3x}$$

$$13) \lim_{x \rightarrow +\infty} \left(\frac{x^2}{x^2-1}\right)^{x^2}$$

$$14) \lim_{x \rightarrow +\infty} \left(\frac{x^2+3x}{x^2-2}\right)^{2x}$$

$$15) \lim_{x \rightarrow +\infty} \left(\frac{\sqrt{x}+2}{\sqrt{x}-2}\right)^{-3x}$$

$$16) \lim_{x \rightarrow +\infty} \left(\frac{3x+1}{2x}\right)^{1-x}$$

$$17) \lim_{x \rightarrow +\infty} \left(\frac{2x+1}{2x}\right)^{3x-2}$$

$$18) \lim_{x \rightarrow +\infty} \left(\frac{2x+3}{x-4}\right)^{\frac{3x+1}{2}}$$

SOLUCIONES

Ejercicio 1. Calcular los siguientes límites, resolviendo las indeterminaciones en los casos que sea necesario:

$$1) \lim_{x \rightarrow +\infty} \frac{4-2x}{x-2} = \frac{0}{0} = \lim_{x \rightarrow +\infty} \frac{2(2-x)}{x-2} = \lim_{x \rightarrow +\infty} (-2) = -2$$

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

$$3) \lim_{x \rightarrow 2} \frac{x^2 - x - 2}{x^2 - 2x} = \frac{0}{0} = \lim_{x \rightarrow 2} \frac{(x-2)(x+1)}{x(x-2)} = \lim_{x \rightarrow 2} \frac{(x+1)}{x} = \frac{3}{2}$$

$$4) \lim_{x \rightarrow 1} \frac{x^2 - 4x + 3}{x^2 + x - 2} = \frac{0}{0} = \lim_{x \rightarrow 1} \frac{(x-3)(x-1)}{(x+2)(x-1)} = \lim_{x \rightarrow 1} \frac{(x-3)}{(x+2)} = -\frac{2}{3}$$

$$5) \lim_{x \rightarrow 4} \frac{x^2 - 8x + 16}{x^2 - 16} = \frac{0}{0} = \lim_{x \rightarrow 4} \frac{(x-4)^2}{(x-4)(x+4)} = \lim_{x \rightarrow 4} \frac{(x-4)}{(x+4)} = 0$$

$$6) \lim_{x \rightarrow 2^+} \frac{2 - \sqrt{x+2}}{x-2} = \frac{0}{0} = \lim_{x \rightarrow 2^+} \frac{(2 - \sqrt{x+2})(2 + \sqrt{x+2})}{(x-2)(2 + \sqrt{x+2})} = \lim_{x \rightarrow 2^+} \frac{(4 - x - 2)}{(x-2)(2 + \sqrt{x+2})} = \lim_{x \rightarrow 2^+} \frac{(2-x)}{(x-2)(2 + \sqrt{x+2})} =$$

$$= \lim_{x \rightarrow 2^+} \frac{-1}{(2 + \sqrt{x+2})} = \frac{-1}{4}$$

$$7) \lim_{x \rightarrow 1} \frac{\sqrt{x-1}}{x^2 - 1} = \frac{0}{0} = \lim_{x \rightarrow 1} \frac{\sqrt{x-1}}{(x-1)(x+1)} = \lim_{x \rightarrow 1} \frac{1}{\sqrt{x-1}(x+1)} = \infty$$

$$8) \lim_{x \rightarrow +\infty} \frac{3 - \sqrt{x-2}}{\sqrt{2x+1}} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$9) \lim_{x \rightarrow +\infty} \left(\frac{2x-1}{3x+2} \right)^x = \left(\frac{2}{3} \right)^{+\infty} = 0$$

$$10) \lim_{x \rightarrow 3} \left(\frac{2x}{x^2 - 9} - \frac{1}{x-3} \right) = \infty - \infty = \lim_{x \rightarrow 3} \left(\frac{2x - (x+3)}{x^2 - 9} \right) = \lim_{x \rightarrow 3} \left(\frac{2x - x - 3}{x^2 - 9} \right) = \lim_{x \rightarrow 3} \left(\frac{x-3}{x^2 - 9} \right) = \frac{0}{0}$$

$$= \lim_{x \rightarrow 3} \left(\frac{x-3}{x^2 - 9} \right) = \lim_{x \rightarrow 3} \frac{x-3}{(x-3)(x+3)} = \lim_{x \rightarrow 3} \frac{1}{x+3} = \frac{1}{6}$$

$$11) \lim_{x \rightarrow +\infty} \left(\frac{x^2 - 1}{x+2} - \frac{x^3}{x^2 + 1} \right) = \infty - \infty = \lim_{x \rightarrow +\infty} \frac{(x^2 - 1)(x^2 + 1) - x^3(x+2)}{(x+2)(x^2 + 1)} = \lim_{x \rightarrow +\infty} \frac{x^4 - 1 - x^4 - 2x^3}{(x+2)(x^2 + 1)} =$$

$$= \lim_{x \rightarrow +\infty} \frac{-2x^3 - 1}{(x+2)(x^2 + 1)} = -2$$

$$12) \lim_{x \rightarrow +\infty} \left(2 - \frac{1}{x^2 + 1}\right)^{3-x} = 2^{-\infty} = \left(\frac{1}{2}\right)^{+\infty} = 0$$

$$13) \lim_{x \rightarrow 0} \frac{3x}{\sqrt{x+4}-2} = \frac{0}{0} = \lim_{x \rightarrow 0} \frac{3x(\sqrt{x+4}+2)}{(\sqrt{x+4}-2)(\sqrt{x+4}+2)} = \lim_{x \rightarrow 0} \frac{3x(\sqrt{x+4}+2)}{x+4-4} = \lim_{x \rightarrow 0} 3(\sqrt{x+4}+2) = 12$$

$$14) \lim_{x \rightarrow +\infty} \frac{3x+2}{\sqrt{x^2-3x+1}} = 3$$

$$15) \lim_{x \rightarrow +\infty} (\sqrt{x^2-3x}-2x) = \infty - \infty = \lim_{x \rightarrow +\infty} \frac{(\sqrt{x^2-3x}+2x)(\sqrt{x^2-3x}-2x)}{(\sqrt{x^2-3x}+2x)} = \lim_{x \rightarrow +\infty} \frac{x^2-3x-4x^2}{(\sqrt{x^2-3x}+2x)} =$$

$$= \lim_{x \rightarrow +\infty} \frac{-3x^2-3x}{(\sqrt{x^2-3x}+2x)} = -\infty$$

$$16) \lim_{x \rightarrow +\infty} \left(\frac{4x-2}{3x+5}\right)^{x^2+1} = \left(\frac{4}{3}\right)^{+\infty} = +\infty$$

$$17) \lim_{x \rightarrow 2} \frac{2x^2+x-10}{x^2+x-6} = \lim_{x \rightarrow 2} \frac{(2x+5)(x-2)}{(x+3)(x-2)} = \lim_{x \rightarrow 2} \frac{2x+5}{x+3} = \frac{9}{5}$$

$$18) \lim_{x \rightarrow +\infty} (\sqrt{x-3}-\sqrt{x+1}) = \infty - \infty = \lim_{x \rightarrow +\infty} \frac{(\sqrt{x-3}-\sqrt{x+1})(\sqrt{x-3}+\sqrt{x+1})}{(\sqrt{x-3}+\sqrt{x+1})} = \lim_{x \rightarrow +\infty} \frac{x-3-x-1}{(\sqrt{x-3}+\sqrt{x+1})} =$$

$$= \lim_{x \rightarrow +\infty} \frac{-4}{(\sqrt{x-3}+\sqrt{x+1})} = 0$$

$$19) \lim_{x \rightarrow 2} \frac{\sqrt{x^2-4}}{\sqrt[3]{x-2}} = \frac{0}{0} = \lim_{x \rightarrow 2} \frac{\sqrt{(x-2)(x+2)}}{\sqrt[3]{x-2}} = \lim_{x \rightarrow 2} \frac{\sqrt[6]{(x+2)^3(x-2)^3}}{(x-2)^2} = \lim_{x \rightarrow 2} \sqrt[6]{(x+2)^3(x-2)} = 0$$

$$20) \lim_{x \rightarrow 1} \frac{x^3-3x+2}{x^3-1} = \frac{0}{0} = \lim_{x \rightarrow 1} \frac{(x^2+x-2)(x-1)}{(x-1)(x^2+x+1)} = \lim_{x \rightarrow 1} \frac{(x^2+x-2)}{(x^2+x+1)} = 0$$

$$21) \lim_{x \rightarrow -\infty} \frac{x^2+2x-1}{\sqrt{1-x^3}} = +\infty$$

$$22) \lim_{x \rightarrow +\infty} \frac{5x-2}{\sqrt{x^3+2x}} = 0$$

$$23) \lim_{x \rightarrow 3} \frac{x^2+x-12}{x^3-27} = \frac{0}{0} = \lim_{x \rightarrow 3} \frac{(x+4)(x-3)}{(x-3)(x^2+3x+9)} = \lim_{x \rightarrow 3} \frac{(x+4)}{(x^2+3x+9)} = \frac{7}{27}$$

$$24) \lim_{x \rightarrow 2} \frac{x-2}{\sqrt{x-1}-1} = \frac{0}{0} = \lim_{x \rightarrow 2} \frac{(x-2)(\sqrt{x-1}+1)}{(\sqrt{x-1}-1)(\sqrt{x-1}+1)} = \lim_{x \rightarrow 2} \frac{(x-2)(\sqrt{x-1}+1)}{x-1-1} = \lim_{x \rightarrow 2} (\sqrt{x-1}+1) = 2$$

$$25) \lim_{x \rightarrow 1^-} \frac{3x+2}{x^2-1} = -\infty \quad (x^2 < 1)$$

$$26) \lim_{x \rightarrow 1} \frac{x^3-x^2-x+1}{x^3-x} = \frac{0}{0} = \lim_{x \rightarrow 1} \frac{(x-1)(x^2-1)}{x(x^2-1)} = \lim_{x \rightarrow 1} \frac{x-1}{x} = 0$$

Ejercicio 2. Calcula el valor de a para que exista el límite en $x = 1$ de la función $f(x)$

$$f(x) = \begin{cases} 2^x + a & \text{si } x \leq 1 \\ x^2 - 3a + 5 & \text{si } x > 1 \end{cases}$$

$$\lim_{x \rightarrow 1^-} f(x) = \lim_{x \rightarrow 1^-} (2^x + a) = 2 + a$$

$$\lim_{x \rightarrow 1^+} f(x) = \lim_{x \rightarrow 1^+} (x^2 - 3a + 5) = 6 - 3a$$

Para que exista el límite en $x = 1$, debe verificarse que:

$$\lim_{x \rightarrow 1^-} f(x) = \lim_{x \rightarrow 1^+} f(x) \Rightarrow 2 + a = 6 - 3a \Rightarrow 4a = 4 \Rightarrow a = 1 \Rightarrow \lim_{x \rightarrow 1} f(x) = 3$$

Ejercicio 3. Calcula el valor de m para que se verifique:

$$\lim_{x \rightarrow 3} \frac{x^2 - 2x - 3}{x^2 + mx + 3} = 2$$

$$\lim_{x \rightarrow 3} \frac{x^2 - 2x - 3}{x^2 + mx + 3} = \frac{0}{12 + 3m} \Rightarrow 12 + 3m = 0 \Rightarrow m = -4$$

$$\lim_{x \rightarrow 3} \frac{x^2 - 2x - 3}{x^2 - 4x + 3} = \lim_{x \rightarrow 3} \frac{(x-3)(x+1)}{(x-3)(x-1)} = \lim_{x \rightarrow 3} \frac{x+1}{x-1} = \frac{4}{2} = 2$$

Ejercicio 4. Hallar los siguientes límites del tipo del número e :

Recuerda: $\lim_{x \rightarrow +\infty} f(x)^{g(x)} = e^{\lim_{x \rightarrow +\infty} [f(x)-1] \cdot g(x)}$

1) $\lim_{x \rightarrow +\infty} \left(1 + \frac{7}{x}\right)^{2x+3}$

$$[f(x)-1] \cdot g(x) = \left(1 + \frac{7}{x} - 1\right) \cdot (2x+3) = \frac{7(2x+3)}{x} \rightarrow 14$$

$$\lim_{x \rightarrow +\infty} \left(1 + \frac{7}{x}\right)^{2x+3} = e^{14}$$

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

$$[f(x)-1] \cdot g(x) = \left(1 + \frac{3}{5x+2} - 1\right) \cdot (5x+2) = \frac{3(5x+2)}{5x+2} = 3 \rightarrow 3$$

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

$$3) \lim_{x \rightarrow +\infty} \left(1 + \frac{4}{x^2}\right)^{x-4}$$

$$[f(x)-1] \cdot g(x) = \left(1 + \frac{4}{x^2} - 1\right) \cdot (x-4) = \frac{4(x-4)}{x^2} \rightarrow 0$$

$$\lim_{x \rightarrow +\infty} \left(1 + \frac{4}{x^2}\right)^{x-4} = e^0 = 1$$

$$4) \lim_{x \rightarrow +\infty} \left(1 + \frac{6}{x}\right)^{x+2}$$

$$[f(x)-1] \cdot g(x) = \left(1 + \frac{6}{x} - 1\right) \cdot (x+2) = \frac{6(x+2)}{x} = 6$$

$$\lim_{x \rightarrow +\infty} \left(1 + \frac{6}{x}\right)^{x+2} = e^6$$

$$5) \lim_{x \rightarrow +\infty} \left(1 - \frac{x}{x^2-1}\right)^{x^2}$$

$$[f(x)-1] \cdot g(x) = \left(1 - \frac{x}{x^2-1} - 1\right) \cdot x^2 = \frac{x \cdot x^2}{x^2-1} = \frac{x^3}{x^2-1} \rightarrow +\infty$$

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

$$6) \lim_{x \rightarrow +\infty} \left(1 + \frac{3}{x^2}\right)^{-2x}$$

$$[f(x)-1] \cdot g(x) = \left(1 + \frac{3}{x^2} - 1\right) \cdot (-2x) = -\frac{6x}{x^2} \rightarrow 0$$

$$\lim_{x \rightarrow +\infty} \left(1 + \frac{3}{x^2}\right)^{-2x} = e^0 = 1$$

$$7) \lim_{x \rightarrow +\infty} \left(1 + \frac{x+1}{x}\right)^{2x^2+1} = 2^{+\infty} = +\infty$$

$$8) \lim_{x \rightarrow +\infty} \left(1 + \frac{3x-1}{2x}\right)^{2x-1} = \left(1 + \frac{3}{2}\right)^{+\infty} = +\infty$$

$$9) \lim_{x \rightarrow +\infty} \left(\frac{x+2}{x-3}\right)^x$$

$$[f(x)-1] \cdot g(x) = \left(\frac{x+2}{x-3} - 1\right) \cdot x = \left(\frac{x+2-x+3}{x-3}\right) \cdot x = \frac{5x}{x-3} \rightarrow 5 \quad \rightarrow \lim_{x \rightarrow +\infty} \left(\frac{x+2}{x-3}\right)^x = e^5$$

$$10) \lim_{x \rightarrow +\infty} \left(\frac{x+7}{x+2} \right)^{x+2}$$

$$[f(x)-1] \cdot g(x) = \left(\frac{x+7}{x+2} - 1 \right) \cdot (x+2) = \left(\frac{x+7-x-2}{x+2} \right) \cdot (x+2) = \frac{5(x+2)}{x+2} \rightarrow 5$$

$$\lim_{x \rightarrow +\infty} \left(\frac{x+7}{x+2} \right)^{x+2} = e^5$$

$$11) \lim_{x \rightarrow +\infty} \left(\frac{x+1}{x} \right)^{\frac{x}{3}+1}$$

$$[f(x)-1] \cdot g(x) = \left(\frac{x+1}{x} - 1 \right) \left(\frac{x}{3} + 1 \right) = \frac{1}{x} \cdot \frac{x+3}{3} = \frac{x+3}{3x} \rightarrow \frac{1}{3}$$

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

$$12) \lim_{x \rightarrow +\infty} \left(\frac{x+1}{x-2} \right)^{3x}$$

$$[f(x)-1] \cdot g(x) = \left(\frac{x+1}{x-2} - 1 \right) (3x) = \frac{x+1-x+2}{x-2} (3x) = \frac{9x}{x-2} \rightarrow 9$$

$$\lim_{x \rightarrow +\infty} \left(\frac{x+1}{x-2} \right)^{3x} = e^9$$

$$13) \lim_{x \rightarrow +\infty} \left(\frac{x^2}{x^2-1} \right)^{x^2}$$

$$[f(x)-1] \cdot g(x) = \left(\frac{x^2}{x^2-1} - 1 \right) \cdot x^2 = \frac{x^2 - x^2 + 1}{x^2-1} \cdot x^2 = \frac{x^2}{x^2-1} \rightarrow 1$$

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

$$14) \lim_{x \rightarrow +\infty} \left(\frac{x^2+3x}{x^2-2} \right)^{2x}$$

$$[f(x)-1] \cdot g(x) = \left(\frac{x^2+3x}{x^2-2} - 1 \right) \cdot 2x = \frac{x^2+3x-x^2+2}{x^2-2} \cdot 2x = \frac{3x+2}{x^2-2} \cdot 2x = \frac{6x^2+4x}{x^2-2} \rightarrow 6$$

$$\lim_{x \rightarrow +\infty} \left(\frac{x^2+3x}{x^2-2} \right)^{2x} = e^6$$

$$15) \lim_{x \rightarrow +\infty} \left(\frac{\sqrt{x}+2}{\sqrt{x}-2} \right)^{-3x}$$

$$[f(x)-1] \cdot g(x) = \left(\frac{\sqrt{x}+2}{\sqrt{x}-2} - 1 \right) \cdot (-3x) = \frac{\sqrt{x}+2-\sqrt{x}+2}{\sqrt{x}-2} \cdot (-3x) = \frac{4(-3x)}{\sqrt{x}-2} \rightarrow -\infty$$

$$\lim_{x \rightarrow +\infty} \left(\frac{\sqrt{x}+2}{\sqrt{x}-2} \right)^{-3x} = e^{-\infty} = 0$$

$$16) \lim_{x \rightarrow +\infty} \left(\frac{3x+1}{2x} \right)^{1-x} = \left(\frac{3}{2} \right)^{-\infty} = \left(\frac{2}{3} \right)^{+\infty} \rightarrow 0$$

$$17) \lim_{x \rightarrow +\infty} \left(\frac{2x+1}{2x} \right)^{3x-2}$$

$$[f(x)-1] \cdot g(x) = \left(\frac{2x+1}{2x} - 1 \right) (3x-2) = \frac{2x+1-2x}{2x} (3x-2) = \frac{3x-2}{2x} = \frac{3}{2}$$

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

$$18) \lim_{x \rightarrow +\infty} \left(\frac{2x+3}{x-4} \right)^{\frac{3x+1}{2}} = 2^{\frac{3}{2}} = \sqrt{8}$$