**COCIENTE DE POLINOMIOS**

$$\lim_{n\to\infty}\frac{(n^2+2)(n^2-2)}{(n+2)^2(2n-1)^2}=\left(\frac{+\infty}{+\infty}\right)_{ind}=\lim_{n\to\infty}\frac{n^2\left(1+\frac{2}{n^2}\right)n^2\left(1-\frac{2}{n^2}\right)}{\left(n\left(1+\frac{2}{n}\right)\right)^2\left(n\left(2-\frac{1}{n}\right)\right)^2}=\lim_{n\to\infty}\frac{n^2\left(1+\frac{2}{n^2}\right)n^2\left(1-\frac{2}{n^2}\right)}{n^2\left(1+\frac{2}{n}\right)^2n^2\left(2-\frac{1}{n}\right)^2}=\lim_{n\to\infty}\frac{\left(1+\frac{2}{n^2}\right)\left(1-\frac{2}{n^2}\right)}{\left(1+\frac{2}{n}\right)^2\left(2-\frac{1}{n}\right)^2}=\frac{1}{4}$$

$$\lim_{n\to\infty}\frac{3n^2-n+1}{n+5}=\left(\frac{+\infty}{+\infty}\right)_{ind}=\lim_{n\to\infty}\frac{n^2\left(3-\frac{1}{n}+\frac{1}{n^2}\right)}{n\left(1+\frac{5}{n}\right)}=\lim_{n\to\infty}\frac{n\left(3-\frac{1}{n}+\frac{1}{n^2}\right)}{\left(1+\frac{5}{n}\right)}=+\infty$$

$$\lim_{n\to\infty}\frac{-n^3+2n-1}{n^2+n+2}=\left(\frac{-\infty}{+\infty}\right)_{ind}=\lim_{n\to\infty}\frac{n^3\left(-1+\frac{2}{n^2}-\frac{1}{n^3}\right)}{n^2\left(1+\frac{1}{n}+\frac{2}{n^2}\right)}=\lim_{n\to\infty}\frac{n\left(-1+\frac{2}{n^2}-\frac{1}{n^3}\right)}{\left(1+\frac{1}{n}+\frac{2}{n^2}\right)}=-\infty$$

**COCIENTE DE POLINOMIOS CON RAICES**

$$\lim_{n\to\infty}\frac{n^2+2n-1}{\sqrt{n^2-n+4}}=\left(\frac{+\infty}{+\infty}\right)_{ind}=\lim_{n\to\infty}\frac{n^2\cdot\left(1+\frac{2}{n}-\frac{1}{n^2}\right)}{\sqrt{n^2\cdot\left(1-\frac{1}{n}+\frac{4}{n^2}\right)}}=\lim_{n\to\infty}\frac{n^2\cdot\left(1+\frac{2}{n}-\frac{1}{n^2}\right)}{n\cdot\sqrt{1-\frac{1}{n}+\frac{4}{n^2}}}=\lim_{n\to\infty}\frac{n\cdot\left(1+\frac{2}{n}-\frac{1}{n^2}\right)}{\sqrt{1-\frac{1}{n}+\frac{4}{n^2}}}=+\infty\cdot 1=+\infty$$

$$\lim_{n\to\infty}\frac{3n^5+2n^3-1}{\sqrt{n^6-n^4+4}}=\left(\frac{+\infty}{+\infty}\right)_{ind}=\lim_{n\to\infty}\frac{n^5\cdot\left(3+\frac{2}{n^2}-\frac{1}{n^5}\right)}{\sqrt{n^6\cdot\left(1-\frac{1}{n^2}+\frac{4}{n^6}\right)}}=\lim_{n\to\infty}\frac{n^5\cdot\left(3+\frac{2}{n^2}-\frac{1}{n^5}\right)}{n^3\cdot\sqrt{1-\frac{1}{n^2}+\frac{4}{n^6}}}=\lim_{n\to\infty}\frac{n^2\cdot\left(3+\frac{2}{n^2}-\frac{1}{n^5}\right)}{\sqrt{1-\frac{1}{n^2}+\frac{4}{n^6}}}=+\infty\cdot 3=+\infty$$

$$\lim_{n\to\infty}\frac{3n^2-5n}{\sqrt{n^4-2n+3}}=\left(\frac{+\infty}{+\infty}\right)_{ind}=\lim_{n\to\infty}\frac{n^2\cdot\left(3-\frac{5}{n}\right)}{\sqrt{n^4\cdot\left(1-\frac{2}{n^3}+\frac{3}{n^4}\right)}}=\lim_{n\to\infty}\frac{n^2\cdot\left(3-\frac{5}{n}\right)}{n^2\cdot\sqrt{\left(1-\frac{2}{n^3}+\frac{3}{n^4}\right)}}=\lim_{n\to\infty}\frac{\left(3-\frac{5}{n}\right)}{\sqrt{\left(1-\frac{2}{n^3}+\frac{3}{n^4}\right)}}=3$$

$$\lim_{n\to\infty}\frac{n^4-2n-3}{\sqrt{2n^5-1}}=\left(\frac{+\infty}{+\infty}\right)_{ind}=\lim_{n\to\infty}\frac{n^4\cdot\left(1-\frac{2}{n^3}-\frac{3}{n^4}\right)}{\sqrt{n^5\cdot\left(2-\frac{1}{n^5}\right)}}=\lim_{n\to\infty}\frac{n^4\cdot\left(1-\frac{2}{n^3}-\frac{3}{n^4}\right)}{n^2\cdot\sqrt{n\cdot\left(2-\frac{1}{n^5}\right)}}=\lim_{n\to\infty}\frac{n^2\cdot\left(1-\frac{2}{n^3}-\frac{3}{n^4}\right)}{\sqrt{n\cdot\left(2-\frac{1}{n^5}\right)}}=\lim_{n\to\infty}\frac{n^2\cdot\left(1-\frac{2}{n^3}-\frac{3}{n^4}\right)}{\sqrt{n}\cdot\sqrt{\left(2-\frac{1}{n^5}\right)}}$$

$$=\lim_{n\to\infty}\frac{\sqrt{n^3}\cdot\left(1-\frac{2}{n^3}-\frac{3}{n^4}\right)}{\sqrt{\left(2-\frac{1}{n^5}\right)}}=+\infty\cdot 1=+\infty$$

$$\lim_{n\to\infty}\frac{-n^4+3}{\sqrt{3n^4-2n}}=\left(\frac{-\infty}{+\infty}\right)_{ind}=\lim_{n\to\infty}\frac{n^4\cdot\left(-1+\frac{3}{n^4}\right)}{\sqrt{n^4\cdot\left(3-\frac{2}{n^3}\right)}}=\lim_{n\to\infty}\frac{n^4\cdot\left(-1+\frac{3}{n^4}\right)}{n^2\cdot\sqrt{\left(3-\frac{2}{n^3}\right)}}=\lim_{n\to\infty}\frac{n^2\cdot\left(-1+\frac{3}{n^4}\right)}{\sqrt{\left(3-\frac{2}{n^3}\right)}}=+\infty\cdot\left(\frac{-1}{\sqrt{3}}\right)=-\infty$$

$$\lim_{n\to\infty}\frac{5n^2-n+2}{\sqrt{7n^6+3n^3}}=\left(\frac{+\infty}{+\infty}\right)_{ind}=\lim_{n\to\infty}\frac{n^2\cdot\left(5-\frac{1}{n}+\frac{2}{n^2}\right)}{\sqrt{n^6\cdot\left(7+\frac{3}{n^3}\right)}}=\lim_{n\to\infty}\frac{n^2\cdot\left(5-\frac{1}{n}+\frac{2}{n^2}\right)}{n^3\cdot\sqrt{\left(7+\frac{3}{n^3}\right)}}=\lim_{n\to\infty}\frac{\left(5-\frac{1}{n}+\frac{2}{n^2}\right)}{n\cdot\sqrt{\left(7+\frac{3}{n^3}\right)}}=\frac{5}{+\infty}=0$$

$$\lim_{n\to\infty}\frac{-n^3+3n}{\sqrt{9n^4+4}}=\left(\frac{-\infty}{+\infty}\right)_{ind}=\lim_{n\to\infty}\frac{-n^3\cdot\left(1+\frac{3}{n}\right)}{\sqrt{n^4\cdot\left(9+\frac{4}{n^4}\right)}}=\lim_{n\to\infty}\frac{-n^3\cdot\left(1+\frac{3}{n}\right)}{n^2\cdot\sqrt{\left(9+\frac{4}{n^4}\right)}}=\lim_{n\to\infty}\frac{-n\cdot\left(1+\frac{3}{n}\right)}{\sqrt{\left(9+\frac{4}{n^4}\right)}}=-\infty\cdot\frac{1}{3}=-\infty$$

$$\lim_{n\to\infty}\frac{7n^3-n+2}{\sqrt{7n^6+3n^3}}=\left(\frac{+\infty}{+\infty}\right)_{ind}=\lim_{n\to\infty}\frac{n^3\cdot\left(7-\frac{1}{n^2}+\frac{2}{n^3}\right)}{\sqrt{n^6\cdot\left(7+\frac{3}{n^3}\right)}}=\lim_{n\to\infty}\frac{n^3\cdot\left(7-\frac{1}{n^2}+\frac{2}{n^3}\right)}{n^3\cdot\sqrt{\left(7+\frac{3}{n^3}\right)}}=\lim_{n\to\infty}\frac{\left(7-\frac{1}{n^2}+\frac{2}{n^3}\right)}{\sqrt{\left(7+\frac{3}{n^3}\right)}}=\frac{7}{\sqrt{7}}=\frac{7}{\sqrt{7}}\cdot\frac{\sqrt{7}}{\sqrt{7}}=\sqrt{7}$$

$$\lim_{n\to\infty}\frac{\sqrt{8n^8-4n^2}}{2n^3-4n^4}=\left(\frac{+\infty}{+\infty}\right)_{ind}=\lim_{n\to\infty}\frac{\sqrt{n^8\cdot\left(8-\frac{4}{n^6}\right)}}{n^4\cdot\left(\frac{2}{n}-4\right)}=\lim_{n\to\infty}\frac{n^4\cdot\sqrt{\left(8-\frac{4}{n^6}\right)}}{n^4\cdot\left(\frac{2}{n}-4\right)}=\lim_{n\to\infty}\frac{\sqrt{\left(8-\frac{4}{n^6}\right)}}{\left(\frac{2}{n}-4\right)}=\frac{\sqrt{8}}{-4}=\frac{2\sqrt{2}}{-4}=\frac{\sqrt{2}}{-2}$$

**DIFERENCIA DE POLINOMIOS**

$$\lim_{n\to\infty}\left(\frac{6n-5}{3n^2-2}-\frac{5n-3}{4n^2+1}\right)=0-0=0$$

$$\lim_{n\to\infty}\left(\frac{n^2}{2n-1}-\frac{n^2+1}{2n+1}\right)=(+\infty)-(+\infty)_{ind}=\lim_{n\to\infty}\left(\frac{n^2(2n+1)-(n^2+1)(2n-1)}{(2n-1)(2n+1)}\right)$$

$$=\lim_{n\to\infty}\left(\frac{2n^3+n^2-2n^3+n^2-2n+1}{(2n-1)(2n+1)}\right)=\lim_{n\to\infty}\left(\frac{2n^2-2n+1}{(2n-1)(2n+1)}\right)=\frac{2}{4}=\frac{1}{2}$$

$$\lim_{n\to\infty}\left(\frac{n^2+1}{3n+1}-\frac{n^2}{3n-1}\right)=(+\infty)-(+\infty)_{ind}=\lim_{n\to\infty}\left(\frac{(n^2+1)(3n-1)-n^2(3n+1)}{(3n+1)(3n-1)}\right)$$

$$=\lim_{n\to\infty}\left(\frac{3n^3-n^2+3n-1-3n^3-n^2}{(3n+1)(3n-1)}\right)=\lim_{n\to\infty}\left(\frac{-2n^2+3n-1}{(3n+1)(3n-1)}\right)=\frac{-2}{9}$$

$$\lim_{n\to\infty}\left(\frac{n^3+2n^2}{3n^2-n}-\frac{2n^3-1}{3n^2-3}\right)=(+\infty)-(+\infty)_{ind}=\lim_{n\to\infty}\left(\frac{(n^3+2n^2)(3n^2-3)-(3n^2-n)(2n^3-1)}{(3n^2-n)(3n^2-3)}\right)$$
$$=\lim_{n\to\infty}\left(\frac{3n^5-3n^3+6n^4-6n^2-6n^5-3n^2+2n^4-n}{(3n^2-n)(3n^2-3)}\right)=\lim_{n\to\infty}\left(\frac{-2n^5+8n^4-3n^3-9n^2-n}{(3n^2-n)(3n^2-3)}\right)=-\infty$$

$$\lim_{n\to\infty}\left(2n^2-1-\frac{2n^4+5n^3-n^2}{n^2+2}\right)=(+\infty)-(+\infty)_{ind}=\lim_{n\to\infty}\frac{(2n^2-1)(n^2+2)-(2n^4+5n^3-n^2)}{n^2+2}$$
$$=\lim_{n\to\infty}\frac{2n^4+4n^2-n^2-2-2n^4-5n^3+n^2}{n^2+2}=\lim_{n\to\infty}\frac{-5n^3+4n^2-2}{n^2+2}=-\infty$$

$$\lim_{n\to\infty}\left(3n+2-\frac{7+3n^2}{n+1}\right)=(+\infty)-(+\infty)_{ind}=\lim_{n\to\infty}\frac{(3n+2)(n+1)-(7+3n^2)}{n+1}=\lim_{n\to\infty}\frac{3n^2+3n+2n+2-7-3n^2}{n+1}=\lim_{n\to\infty}\frac{5n-5}{n+1}=5$$

**DIFERENCIA DE POLINOMIOS CON RAICES**

$$\lim_{n\to\infty}\sqrt{2n^2+3n-2}-\sqrt{2n^2+2}=(+\infty)-(+\infty)_{ind}=\lim_{n\to\infty}\left(\sqrt{2n^2+3n-2}-\sqrt{2n^2+2}\right)\cdot\frac{\left(\sqrt{2n^2+3n-2}+\sqrt{2n^2+2}\right)}{\left(\sqrt{2n^2+3n-2}+\sqrt{2n^2+2}\right)}$$
$$=\lim_{n\to\infty}\frac{\left(\sqrt{2n^2+3n-2}\right)^2-\left(\sqrt{2n^2+2}\right)^2}{\sqrt{2n^2+3n-2}+\sqrt{2n^2+2}}=\lim_{n\to\infty}\frac{2n^2+3n-2-(2n^2+2)}{\sqrt{2n^2+3n-2}+\sqrt{2n^2+2}}=$$

$$\lim_{n\to\infty}\frac{2n^2+3n-2-2n^2-2}{\sqrt{2n^2+3n-2}+\sqrt{2n^2+2}}=\lim_{n\to\infty}\frac{3n-4}{\sqrt{2n^2+3n-2}+\sqrt{2n^2+2}}=\left(\frac{+\infty}{+\infty}\right)_{ind}=$$

$$\lim_{n\to\infty}\frac{n\cdot\left(3-\frac{4}{n}\right)}{\sqrt{n^2\cdot\left(2+\frac{3}{n}-\frac{2}{n^2}\right)}+\sqrt{n^2\cdot\left(2+\frac{2}{n^2}\right)}}=\lim_{n\to\infty}\frac{n\cdot\left(3-\frac{4}{n}\right)}{n\cdot\sqrt{\left(2+\frac{3}{n}-\frac{2}{n^2}\right)}+n\cdot\sqrt{\left(2+\frac{2}{n^2}\right)}}=$$

$$\lim_{n\to\infty}\frac{n\cdot\left(3-\frac{4}{n}\right)}{n\cdot\left[\sqrt{2+\frac{3}{n}-\frac{2}{n^2}}+\sqrt{2+\frac{2}{n^2}}\right]}=\lim_{n\to\infty}\frac{3-\frac{4}{n}}{\sqrt{2+\frac{3}{n}-\frac{2}{n^2}}+\sqrt{2+\frac{2}{n^2}}}=\frac{3}{2\sqrt{2}}=\frac{3}{2\sqrt{2}}\cdot\frac{\sqrt{2}}{\sqrt{2}}=\frac{3\sqrt{2}}{4}$$

$$\lim_{n\to\infty}\sqrt{n^2+4n+1}-\sqrt{n^2+8n+1}=(+\infty)-(+\infty)_{ind}=\lim_{n\to\infty}\left(\sqrt{n^2+4n+1}-\sqrt{n^2+8n+1}\right)\cdot\frac{\left(\sqrt{n^2+4n+1}+\sqrt{n^2+8n+1}\right)}{\left(\sqrt{n^2+4n+1}+\sqrt{n^2+8n+1}\right)}$$
$$=\lim_{n\to\infty}\frac{\left(\sqrt{n^2+4n+1}\right)^2-\left(\sqrt{n^2+8n+1}\right)^2}{\sqrt{n^2+4n+1}+\sqrt{n^2+8n+1}}=\lim_{n\to\infty}\frac{n^2+4n+1-(n^2+8n+1)}{\sqrt{n^2+4n+1}+\sqrt{n^2+8n+1}}=$$

$$\lim_{n\to\infty}\frac{n^2+4n+1-n^2-8n-1}{\sqrt{n^2+4n+1}+\sqrt{n^2+8n+1}}=\lim_{n\to\infty}\frac{-4n}{\sqrt{n^2+4n+1}+\sqrt{n^2+8n+1}}=\left(\frac{-\infty}{+\infty}\right)_{ind}$$

$$\lim_{n\to\infty}\frac{-4n}{\sqrt{n^2\left(1+\frac{4}{n}+\frac{1}{n^2}\right)}+\sqrt{n^2\left(1+\frac{8}{n}+\frac{1}{n^2}\right)}}=\lim_{n\to\infty}\frac{-4n}{n\sqrt{\left(1+\frac{4}{n}+\frac{1}{n^2}\right)}+n\sqrt{\left(1+\frac{8}{n}+\frac{1}{n^2}\right)}}=$$

$$\lim_{n\to\infty}\frac{-4n}{n\left[\sqrt{\left(1+\frac{4}{n}+\frac{1}{n^2}\right)}+\sqrt{\left(1+\frac{8}{n}+\frac{1}{n^2}\right)}\right]}=\lim_{n\to\infty}\frac{-4}{\sqrt{\left(1+\frac{4}{n}+\frac{1}{n^2}\right)}+\sqrt{\left(1+\frac{8}{n}+\frac{1}{n^2}\right)}}=\frac{-4}{2}=-2$$

$$\lim_{n\to\infty}\sqrt{3+4n^2}-\sqrt{4n^2+n}=(+\infty)-(+\infty)_{ind}=\lim_{n\to\infty}\left(\sqrt{3+4n^2}-\sqrt{4n^2+n}\right)\cdot\frac{\left(\sqrt{3+4n^2}+\sqrt{4n^2+n}\right)}{\left(\sqrt{3+4n^2}+\sqrt{4n^2+n}\right)}=\lim_{n\to\infty}\frac{\left(\sqrt{3+4n^2}\right)^2-\left(\sqrt{4n^2+n}\right)^2}{\sqrt{3+4n^2}+\sqrt{4n^2+n}}$$
$$=\lim_{n\to\infty}\frac{3+4n^2-(4n^2+n)}{\sqrt{3+4n^2}+\sqrt{4n^2+n}}=\lim_{n\to\infty}\frac{3+4n^2-4n^2-n}{\sqrt{3+4n^2}+\sqrt{4n^2+n}}=\lim_{n\to\infty}\frac{3-n}{\sqrt{3+4n^2}+\sqrt{4n^2+n}}=\left(\frac{-\infty}{+\infty}\right)_{ind}$$
$$=\lim_{n\to\infty}\frac{n\left(\frac{3}{n}-1\right)}{\sqrt{n^2\left(\frac{3}{n^2}+4\right)}+\sqrt{n^2\left(4+\frac{1}{n}\right)}}$$
$$=\lim_{n\to\infty}\frac{n\left(\frac{3}{n}-1\right)}{n\sqrt{\left(\frac{3}{n^2}+4\right)}+n\sqrt{\left(4+\frac{1}{n}\right)}}=\lim_{n\to\infty}\frac{n\left(\frac{3}{n}-1\right)}{n\left[\sqrt{\left(\frac{3}{n^2}+4\right)}+\sqrt{\left(4+\frac{1}{n}\right)}\right]}=\lim_{n\to\infty}\frac{\frac{3}{n}-1}{\sqrt{\left(\frac{3}{n^2}+4\right)}+\sqrt{\left(4+\frac{1}{n}\right)}}=\frac{-1}{4}$$

$$\lim_{n\to\infty} \sqrt{n^2-3n+2}-n = (+\infty)-(+\infty)_{ind} = \lim_{n\to\infty}\left(\sqrt{n^2-3n+2}-n\right)\cdot\frac{\left(\sqrt{n^2-3n+2}+n\right)}{\left(\sqrt{n^2-3n+2}+n\right)} = \lim_{n\to\infty}\frac{\left(\sqrt{n^2-3n+2}\right)^2-n^2}{\sqrt{n^2-3n+2}+n}$$

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

$$= \lim_{n\to\infty}\frac{n\left(-3+\frac{2}{n}\right)}{n\left[\sqrt{\left(1-\frac{3}{n}+\frac{2}{n^2}\right)}+1\right]} = \lim_{n\to\infty}\frac{-3+\frac{2}{n}}{\sqrt{\left(1-\frac{3}{n}+\frac{2}{n^2}\right)}+1} = \frac{-3}{2}$$

$$\lim_{n\to\infty}\sqrt{n^2+2n}-\sqrt{n^2+n} = (+\infty)-(+\infty)_{ind} = \lim_{n\to\infty}\left(\sqrt{n^2+2n}-\sqrt{n^2+n}\right)\cdot\frac{\left(\sqrt{n^2+2n}+\sqrt{n^2+n}\right)}{\left(\sqrt{n^2+2n}+\sqrt{n^2+n}\right)} = \lim_{n\to\infty}\frac{\left(\sqrt{n^2+2n}\right)^2-\left(\sqrt{n^2+n}\right)^2}{\sqrt{n^2+2n}+\sqrt{n^2+n}}$$

$$= \lim_{n\to\infty}\frac{n^2+2n-n^2-n}{\sqrt{n^2+2n}+\sqrt{n^2+n}} = \lim_{n\to\infty}\frac{n}{\sqrt{n^2+2n}+\sqrt{n^2+n}} = \left(\frac{+\infty}{+\infty}\right) = \lim_{n\to\infty}\frac{n}{\sqrt{n^2\left(1+\frac{2}{n}\right)}+\sqrt{n^2\left(1+\frac{1}{n}\right)}}$$

$$= \lim_{n\to\infty}\frac{n}{n\sqrt{\left(1+\frac{2}{n}\right)}+n\sqrt{\left(1+\frac{1}{n}\right)}} = \lim_{n\to\infty}\frac{n}{n\left[\sqrt{\left(1+\frac{2}{n}\right)}+\sqrt{\left(1+\frac{1}{n}\right)}\right]} = \lim_{n\to\infty}\frac{1}{\sqrt{\left(1+\frac{2}{n}\right)}+\sqrt{\left(1+\frac{1}{n}\right)}} = \frac{1}{2}$$

$$\lim_{n\to\infty}\sqrt{4n^2-1}-\sqrt{4n^2+2n} = (+\infty)-(+\infty)_{ind} = \lim_{n\to\infty}\left(\sqrt{4n^2-1}-\sqrt{4n^2+2n}\right)\cdot\frac{\left(\sqrt{4n^2-1}+\sqrt{4n^2+2n}\right)}{\left(\sqrt{4n^2-1}+\sqrt{4n^2+2n}\right)}$$

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

$$= \lim_{n\to\infty}\frac{n\left(\frac{-1}{n}-2\right)}{\sqrt{n^2\left(4-\frac{1}{n^2}\right)}+\sqrt{n^2\left(4+\frac{2}{n}\right)}} = \lim_{n\to\infty}\frac{n\left(\frac{-1}{n}-2\right)}{n\sqrt{\left(4-\frac{1}{n^2}\right)}+n\sqrt{\left(4+\frac{2}{n}\right)}} = \lim_{n\to\infty}\frac{n\left(\frac{-1}{n}-2\right)}{n\left[\sqrt{\left(4-\frac{1}{n^2}\right)}+\sqrt{\left(4+\frac{2}{n}\right)}\right]}$$

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

$$\lim_{n\to\infty}\sqrt{2n^4-1}-2n^2 = (+\infty)-(+\infty)_{ind} = \lim_{n\to\infty}(\sqrt{2n^4-1}-2n^2)\cdot\frac{(\sqrt{2n^4-1}+2n^2)}{(\sqrt{2n^4-1}+2n^2)} = \lim_{n\to\infty}\frac{\left(\sqrt{2n^4-1}\right)^2-(2n^2)^2}{\sqrt{2n^4-1}+2n^2} = \lim_{n\to\infty}\frac{2n^4-1-4n^4}{\sqrt{2n^4-1}+2n^2} = \lim_{n\to\infty}\frac{-1-2n^4}{\sqrt{2n^4-1}+2n^2} =$$

$$\left(\frac{-\infty}{+\infty}\right) = \lim_{n\to\infty}\frac{n^4\left(\frac{-1}{n^4}-2\right)}{\sqrt{n^4\left(2-\frac{1}{n^4}\right)}+2n^2} = \lim_{n\to\infty}\frac{n^4\left(\frac{-1}{n^4}-2\right)}{n^2\sqrt{\left(2-\frac{1}{n^4}\right)}+2n^2} = \lim_{n\to\infty}\frac{n^4\left(\frac{-1}{n^4}-2\right)}{n^2\left[\sqrt{\left(2-\frac{1}{n^4}\right)}+2\right]} = \lim_{n\to\infty}\frac{n^2\left(\frac{-1}{n^4}-2\right)}{\sqrt{\left(2-\frac{1}{n^4}\right)}+2} = \frac{-\infty}{\sqrt{2}+2} = -\infty$$

$$\lim_{n\to\infty} n-\sqrt{n^2+10n} = (+\infty)-(+\infty)_{ind} = \lim_{n\to\infty} n-\sqrt{n^2+10n}\cdot\frac{n+\sqrt{n^2+10n}}{n+\sqrt{n^2+10n}} = \lim_{n\to\infty}\frac{n^2-\left(\sqrt{n^2+10n}\right)^2}{n+\sqrt{n^2+10n}} = \lim_{n\to\infty}\frac{n^2-(n^2+10n)}{n+\sqrt{n^2+10n}}$$

$$= \lim_{n\to\infty}\frac{-10n}{n+\sqrt{n^2+10n}} = \left(\frac{-\infty}{+\infty}\right) = \lim_{n\to\infty}\frac{-10n}{n+\sqrt{n^2\left(1+\frac{10}{n}\right)}}$$

$$= \lim_{n\to\infty}\frac{-10n}{n+n\sqrt{\left(1+\frac{10}{n}\right)}} = \lim_{n\to\infty}\frac{-10n}{n\left[1+\sqrt{\left(1+\frac{10}{n}\right)}\right]} = \lim_{n\to\infty}\frac{-10}{1+\sqrt{\left(1+\frac{10}{n}\right)}} = \frac{-10}{2} = -5$$

$$\lim_{n\to\infty}\sqrt{2n^2-1}-\sqrt{2n^2+2n} = (+\infty)-(+\infty)_{ind} = \lim_{n\to\infty}\sqrt{2n^2-1}-\sqrt{2n^2+2n}\cdot\frac{\sqrt{2n^2-1}+\sqrt{2n^2+2n}}{\sqrt{2n^2-1}+\sqrt{2n^2+2n}} = \lim_{n\to\infty}\frac{\left(\sqrt{2n^2-1}\right)^2-\left(\sqrt{2n^2+2n}\right)^2}{\sqrt{2n^2-1}+\sqrt{2n^2+2n}}$$

$$= \lim_{n\to\infty}\frac{2n^2-1-(2n^2+2n)}{\sqrt{2n^2-1}+\sqrt{2n^2+2n}} = \lim_{n\to\infty}\frac{-1-2n}{\sqrt{2n^2-1}+\sqrt{2n^2+2n}} = \left(\frac{-\infty}{+\infty}\right) = \lim_{n\to\infty}\frac{n\left(\frac{-1}{n}-2\right)}{\sqrt{n^2\left(2-\frac{1}{n^2}\right)}+\sqrt{n^2\left(1+\frac{2}{n}\right)}}$$

$$= \lim_{n\to\infty}\frac{n\left(\frac{-1}{n}-2\right)}{n\sqrt{\left(2-\frac{1}{n^2}\right)}+n\sqrt{\left(1+\frac{2}{n}\right)}} = \lim_{n\to\infty}\frac{n\left(\frac{-1}{n}-2\right)}{n\left[\sqrt{\left(2-\frac{1}{n^2}\right)}+\sqrt{\left(1+\frac{2}{n}\right)}\right]} = \lim_{n\to\infty}\frac{\frac{-1}{n}-2}{\sqrt{\left(2-\frac{1}{n^2}\right)}+\sqrt{\left(1+\frac{2}{n}\right)}} = \frac{-2}{\sqrt{2}+1}$$

$$\lim_{n\to\infty}\sqrt{n^2-10n+8}-(n-3) = (+\infty)-(+\infty)_{ind} = \lim_{n\to\infty}\left[\sqrt{n^2-10n+8}-(n-3)\right]\cdot\frac{\left[\sqrt{n^2-10n+8}+(n-3)\right]}{\left[\sqrt{n^2-10n+8}+(n-3)\right]} = \lim_{n\to\infty}\frac{\left(\sqrt{n^2-10n+8}\right)^2-(n-3)^2}{\sqrt{n^2-10n+8}+(n-3)} =$$

$$\lim_{n\to\infty}\frac{n^2-10n+8-(n^2+9-6n)}{\sqrt{n^2-10n+8}+(n-3)} = \lim_{n\to\infty}\frac{n^2-10n+8-n^2-9+6n}{\sqrt{n^2-10n+8}+(n-3)} = \lim_{n\to\infty}\frac{-4n-1}{\sqrt{n^2-10n+8}+(n-3)} = \left(\frac{-\infty}{+\infty}\right)_{ind} =$$

$$\lim_{n\to\infty}\frac{n\left(-4-\frac{1}{n}\right)}{\sqrt{n^2\left(1-\frac{10}{n}+\frac{8}{n^2}\right)}+(n-3)} = \lim_{n\to\infty}\frac{n\left(-4-\frac{1}{n}\right)}{n\sqrt{\left(1-\frac{10}{n}+\frac{8}{n^2}\right)}+n\left(1-\frac{3}{n}\right)} = \lim_{n\to\infty}\frac{n\left(-4-\frac{1}{n}\right)}{n\left[\sqrt{\left(1-\frac{10}{n}+\frac{8}{n^2}\right)}+\left(1-\frac{3}{n}\right)\right]} = \lim_{n\to\infty}\frac{-4-\frac{1}{n}}{\sqrt{\left(1-\frac{10}{n}+\frac{8}{n^2}\right)}+\left(1-\frac{3}{n}\right)} = \frac{-4}{2} = -2$$

**EL NÚMERO e**

$$\lim_{n\to\infty}\left(\frac{4n-2}{4n-3}\right)^{4n+3} = (1^{+\infty})_{ind} = e^{\lim_{n\to\infty}(4n+3)\left(\frac{4n-2}{4n-3}-1\right)} = e^{\lim_{n\to\infty}(4n+3)\left(\frac{4n-2-4n+3}{4n-3}\right)} = e^{\lim_{n\to\infty}(4n+3)\left(\frac{1}{4n-3}\right)} = e^{\lim_{n\to\infty}\left(\frac{4n+3}{4n-3}\right)} = e^1 = e$$

$$\lim_{n\to\infty}\left(\frac{n^2+5}{n^2}\right)^{2n^2} = (1^{+\infty})_{ind} = e^{\lim_{n\to\infty} 2n^2\left(\frac{n^2+5}{n^2}-1\right)} = e^{\lim_{n\to\infty} 2n^2\left(\frac{n^2+5-n^2}{n^2}\right)} = e^{\lim_{n\to\infty} 2n^2\left(\frac{5}{n^2}\right)} = e^{\lim_{n\to\infty}\left(\frac{10n^2}{n^2}\right)} = e^{10}$$

$$\lim_{n\to\infty}\left(\frac{3n^2+1}{3n^2-1}\right)^{\frac{n^2}{n+1}} = (1^{+\infty})_{ind} = e^{\lim_{n\to\infty} \frac{n^2}{n+1}\left(\frac{3n^2+1}{3n^2-1}-1\right)} = e^{\lim_{n\to\infty} \frac{n^2}{n+1}\left(\frac{3n^2+1-3n^2+1}{3n^2-1}\right)} = e^{\lim_{n\to\infty} \frac{n^2}{n+1}\left(\frac{2}{3n^2-1}\right)} = e^0 = 1$$

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

$$\lim_{n\to\infty}\left(\frac{4n-3}{4n}\right)^{\frac{2n^2-1}{2n}} = (1^{+\infty})_{ind} = e^{\lim_{n\to\infty} \left(\frac{2n^2-1}{2n}\right)\left(\frac{4n-3}{4n}-1\right)} = e^{\lim_{n\to\infty} \left(\frac{2n^2-1}{2n}\right)\left(\frac{4n-3-4n}{4n}\right)} = e^{\lim_{n\to\infty} \left(\frac{2n^2-1}{2n}\right)\left(\frac{-3}{4n}\right)} = e^{\frac{-6}{8}} = e^{\frac{-3}{4}}$$

$$\lim_{n\to\infty}\left(\frac{2n+7}{2n-3}\right)^{\frac{n^4}{n^3+1}} = (1^{+\infty})_{ind} = e^{\lim_{n\to\infty} \left(\frac{n^4}{n^3+1}\right)\left(\frac{2n+7}{2n-3}-1\right)} = e^{\lim_{n\to\infty} \left(\frac{n^4}{n^3+1}\right)\left(\frac{2n+7-2n+3}{2n-3}\right)} = e^{\lim_{n\to\infty} \left(\frac{n^4}{n^3+1}\right)\left(\frac{10}{2n-3}\right)} = e^{\frac{10}{2}} = e^5$$

$$\lim_{n\to\infty}\left(\frac{3n^2+5}{3n^2-n}\right)^{n^2-2} = (1^{+\infty})_{ind} = e^{\lim_{n\to\infty} (n^2-2)\left(\frac{3n^2+5}{3n^2-n}-1\right)} = e^{\lim_{n\to\infty} (n^2-2)\left(\frac{3n^2+5-3n^2+n}{3n^2-n}\right)} = e^{\lim_{n\to\infty} (n^2-2)\left(\frac{5+n}{3n^2-n}\right)} = e^{+\infty} = +\infty$$

$$\lim_{n\to\infty}\left(\frac{3n-2}{3n+2}\right)^{3n} = (1^{+\infty})_{ind} = e^{\lim_{n\to\infty} 3n\left(\frac{3n-2}{3n+2}-1\right)} = e^{\lim_{n\to\infty} 3n\left(\frac{3n-2-3n-2}{3n+2}\right)} = e^{\lim_{n\to\infty} 3n\left(\frac{-4}{3n+2}\right)} = e^{-4}$$

$$\lim_{n\to\infty}\left(1-\frac{1}{n}\right)^{n} = (1^{+\infty})_{ind} = e^{\lim_{n\to\infty} n\left(1-\frac{1}{n}-1\right)} = e^{\lim_{n\to\infty} n\left(-\frac{1}{n}\right)} = e^{\lim_{n\to\infty} -1} = e^{-1}$$

**EXPO-POTENDIALES INMEDIATOS**

$$\lim_{n\to\infty}\left(\frac{2n^2+2}{n^2+n+1}\right)^{-n^2-n+1} = 2^{-\infty} = 0$$

$$\lim_{n\to\infty}\left(\frac{2n^4-7n}{5n^4-11}\right)^{n-2n^3+1} = \left(\frac{2}{5}\right)^{-\infty} = \frac{1}{\left(\frac{2}{5}\right)^{+\infty}} = \frac{1}{0^+} = +\infty$$

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

$$\lim_{n\to\infty}(5+2n^3-3n)^{\frac{4n^2-4n^3}{1+2n^3}} = (+\infty)^{-2} = \frac{1}{(+\infty)^2} = \frac{1}{+\infty} = 0$$

$$\lim_{n\to\infty}\left(\frac{2n^2-n+2}{4n^2+2n-3}\right)^{n^3+2n^2-n} = \left(\frac{2}{4}\right)^{+\infty} = 0$$

$$\lim_{n\to\infty}\left(\frac{4n^2-2n}{3n^2+6}\right)^{\frac{-2n^2+3}{3n-1}} = \left(\frac{4}{3}\right)^{-\infty} = \frac{1}{\left(\frac{4}{3}\right)^{+\infty}} = \frac{1}{+\infty} = 0$$