Soluciones de cálculo de límites de sucesiones I

Ejercicio 7 resuelto

Calcular los límites:

Soluciones:

$\boxed{1}$ $\lim \dfrac{2n^3 - 3n + 2}{4n^4 - 5}$

$$\lim \frac{2n^3 - 3n + 2}{4n^4 - 5} = \frac{\infty}{\infty}$$

$$\lim \frac{\frac{2n^3}{n^4} - \frac{3n}{n^4} + \frac{2}{n^4}}{\frac{4n^4}{n^4} - \frac{5}{n^4}} = \lim \frac{\frac{2}{n} - \frac{3}{n^3} + \frac{2}{n^4}}{4 - \frac{5}{n^4}} = \frac{0}{4} = 0$$

$\boxed{2}$ $\lim \dfrac{-2n^4 - 3n + 2}{4n^3 - 5}$

$$\lim \frac{-2n^4 - 3n + 2}{4n^3 - 5} = \frac{\infty}{\infty}$$

$$\lim \frac{-\frac{2n^4}{n^4} - \frac{3n}{n^4} + \frac{2}{n^4}}{\frac{4n^3}{n^4} - \frac{5}{n^4}} = \lim \frac{-2 - \frac{3}{n^3} + \frac{2}{n^4}}{\frac{4}{n} - \frac{5}{n^4}} = \frac{-2}{0} = -\infty$$

$\boxed{3}$ $\lim \dfrac{-2n^4 - 3n + 2}{4n^4 - 5}$

$$\lim \frac{-2n^4 - 3n + 2}{4n^4 - 5} = \frac{\infty}{\infty}$$

$$\lim \frac{-\frac{2n^4}{n^4} - \frac{3n}{n^4} + \frac{2}{n^4}}{\frac{4n^4}{n^4} - \frac{5}{n^4}} = \lim \frac{-2 - \frac{3}{n^3} + \frac{2}{n^4}}{4 - \frac{5}{n^4}} = \frac{-2}{4} = \frac{-1}{2}$$

4 $\lim \frac{(n^2+1)^2 - 3n^2 + 3}{n^3 - 5}$

$$\lim \frac{(n^2+1)^2 - 3n^2 + 3}{n^3 - 5} = \frac{\infty}{\infty}$$

$$\lim \frac{n^4 + 2n + 1 - 3n^2 + 3}{n^3 - 5} = \lim \frac{n^4 - 3n^2 + 2n + 4}{n^3 - 5} =$$

$$= \lim \frac{\frac{n^4}{n^4} - \frac{3n^2}{n^4} + \frac{2n}{n^4} + \frac{4}{n^4}}{\frac{n^3}{n^4} - \frac{5}{n^4}} = \lim \frac{1 - \frac{3}{n^2} + \frac{2}{n^3} + \frac{4}{n^4}}{\frac{1}{n} - \frac{5}{n^4}} = \frac{1}{0} = \infty$$

5 $\lim \frac{(3n^2+4n)^2 (n^3-3)^2 (2n-7)}{(n+2)^3 (n^3-3n)^2 (2n^2-17)}$

$$\lim \frac{(3n^2+4n)^2 (n^3-3)^2 (2n-7)}{(n+2)^3 (n^3-3n)^2 (2n^2-17)} = \frac{\infty}{\infty}$$

$$\lim \frac{9n^4 \cdot n^6 \cdot 2n + \ldots}{n^3 \cdot n^6 \cdot 2n^2 + \ldots} = \lim \frac{18n^{11} + \ldots}{2n^{11} + \ldots} = 9$$

Hallar los límites:

Soluciones:

$\boxed{1}$ $\lim \frac{7n-1}{\sqrt[3]{5n^3+4n-2}}$

$$\lim \frac{7n-1}{\sqrt[3]{5n^3+4n-2}} = \frac{\infty}{\infty}$$

$$\lim \frac{\frac{7n}{n}-\frac{1}{n}}{\sqrt[3]{\frac{5n^3}{n^3}+\frac{4n}{n^3}-\frac{2}{n^3}}} = \lim \frac{7-\frac{1}{n}}{\sqrt[3]{5+\frac{4}{n^2}-\frac{2}{n^3}}} = \frac{7}{\sqrt[3]{5}}$$

$\boxed{2}$ $\lim \frac{7n-1}{\sqrt[3]{5n^3+4n-2}}$

$$\lim \frac{\sqrt{4n^4+n^2+1}}{n^2+1} = \frac{\infty}{\infty}$$

$$\lim \frac{\sqrt{\frac{4n^4}{n^4}+\frac{n^2}{n^4}+\frac{1}{n^4}}}{\frac{n^2}{n^2}+\frac{1}{n^2}} = \lim \frac{\sqrt{4+\frac{1}{n^2}+\frac{1}{n^4}}}{1+\frac{1}{n^2}} = \sqrt{4} = 2$$

$\boxed{3}$ $\lim \frac{2^{n+1}+3^{n+1}}{2^n+3^n}$

$$\lim \frac{2^{n+1}+3^{n+1}}{2^n+3^n} = \frac{\infty}{\infty}$$

$$\lim \frac{2^n \cdot 2 + 3^n \cdot 3}{2^n + 3^n} = \lim \frac{2 \cdot \left(\frac{2}{3}\right)^n + 3}{\left(\frac{2}{3}\right)^n + 1} = 3$$

Ejercicio 9 resuelto

Calcula los siguienteslímites:

Soluciones:

1 $\lim \quad (2n - n^3 + 3n^2)$

$$\lim \quad (2n - n^3 + 3n^2) = \infty - \infty$$

$$\lim \; n^3 \cdot \left(\frac{2}{n^2} - 1 + \frac{3}{n}\right) = \infty \cdot (-1) = -\infty$$

2 $\lim \quad \frac{3n^2 + 4n - 6}{n+2} - 3n$

$$\lim \frac{3n^2 + 4n - 6}{n+2} - 3n = \infty - \infty$$

$$\lim \quad \frac{3n^2 + 4n - 6 - 3n^2 - 6n}{n+2} =$$

$$\lim \quad \frac{-2n - 6}{n+2} = \lim \frac{\frac{-2n}{n} - \frac{6}{n}}{\frac{n}{n} + \frac{2}{n}} = \lim \frac{-2 - \frac{6}{n}}{1 + \frac{2}{n}} = -2$$

$$\lim\left(\frac{n^2}{n-1}-\frac{n^2+1}{n-2}\right)$$

$\boxed{3}$

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

$$\lim\frac{n^3-2n^2-n^3-n+n^2+1}{n^2-3n+2}=\lim_{x\to\infty}\frac{-n^2-n-+1}{n^2-3n+2}=-1$$