10/10/2018

15) $\lim_{n \to \infty} \frac{4n-1}{n+1} = \frac{\infty}{\infty}$

$$\lim_{n \to \infty} \frac{4n-1}{n+1} = \lim_{n \to \infty} \frac{\cancel{n}\left(4 - \overbrace{\frac{1}{n}}^{\to 0}\right)}{\cancel{n}\left(1 + \underbrace{\frac{1}{n}}_{\to 0}\right)} = \frac{4}{1} = 4$$

oppure

$$\frac{4n-1}{n+1} = \frac{\cancel{n}\left(4 - \overbrace{\frac{1}{n}}^{\to 0}\right)}{\cancel{n}\left(1 + \underbrace{\frac{1}{n}}_{\to 0}\right)} \longrightarrow \frac{4}{1} = 4 \qquad \lim_{n \to \infty} \frac{4n-1}{n+1} = 4$$

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

$$\frac{n+1}{3n^2-4} = \frac{\cancel{n}\left(1 + \overbrace{\frac{1}{n}}^{\to 0}\right)}{\underbrace{n^{\cancel{2}}}_{\to +\infty}\underbrace{\left(3 - \underbrace{\frac{4}{n^2}}_{\to 0}\right)}_{\to 3}} \longrightarrow \frac{1}{+\infty} = 0$$

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

$$\frac{n^3-4n+1}{2-3n} = \frac{n^{\cancel{3}\,2}\left(1 - \overbrace{\frac{4}{n^2}}^{\to 0} + \overbrace{\frac{1}{n^3}}^{\to 0}\right)}{\cancel{n}\underbrace{\left(\underbrace{\frac{2}{n}}_{\to 0} - 3\right)}_{\to -3}} \longrightarrow \frac{+\infty}{-3} = -\infty$$

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

$$\left(2n - 3\sqrt{n}\right)\frac{2n + 3\sqrt{n}}{2n + 3\sqrt{n}} =$$

$$= \frac{4n^2 - 9n}{2n + 3\sqrt{n}} = \frac{n^2\left(4 - \frac{9}{n}\right)}{n\left(2 + 3\frac{\sqrt{n}}{n}\right)} = \frac{n^{\cancel{2}}\left(4 - \overset{\to 0}{\frac{9}{n}}\right)}{\cancel{n}\left(2 + \underset{\to 0}{\frac{3}{\sqrt{n}}}\right)} \to \frac{+\infty}{2} = +\infty$$

$$\boxed{\frac{\sqrt{n}}{n}\cdot\frac{\sqrt{n}}{\sqrt{n}} = \frac{\cancel{n}}{\cancel{n}\sqrt{n}} = \frac{1}{\sqrt{n}}}$$

Si poteva risolvere anche così:

$$2n - 3\sqrt{n} = 2\sqrt{n}\cdot\sqrt{n} - 3\sqrt{n} = \underbrace{\sqrt{n}}_{+\infty}\,\underbrace{\left(2\sqrt{n} - 3\right)}_{+\infty} = (+\infty)\cdot(+\infty) =$$

$$= +\infty$$

33) $\lim_{n\to+\infty} \sqrt{\frac{n^2+4}{2n}}$

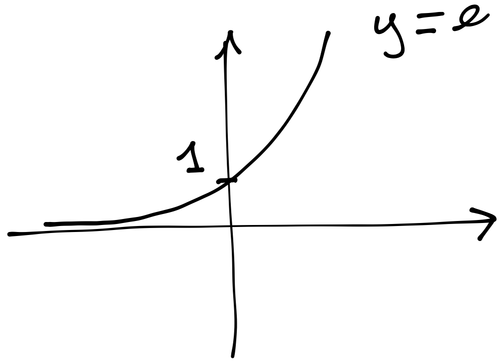
$$\sqrt{\frac{n^2+4}{2n}} = \sqrt{\frac{\overset{+\infty}{n^{\cancel{2}}}\left(1 + \overset{0}{\frac{4}{n^2}}\right)}{2\cancel{n}}} \to \sqrt{+\infty} = +\infty$$

34) $\lim_{n\to+\infty} \sqrt{\frac{n+1}{9n}} = \sqrt{\frac{+\infty}{+\infty}}$

$$\sqrt{\frac{n+1}{9n}} = \sqrt{\frac{\cancel{n}\left(1 + \overset{0}{\frac{1}{n}}\right)}{9\cancel{n}}} \to \sqrt{\frac{1}{9}} = \frac{1}{3}$$

ESPONENZIALI E LOGARITMI

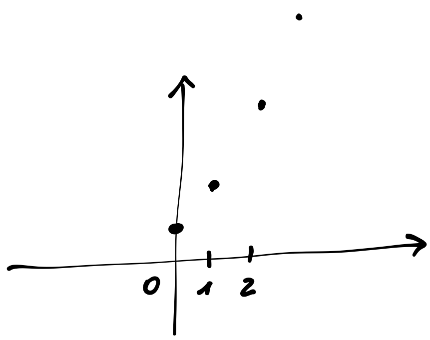
$y = e^x$



$e \simeq 2,718\ldots$

PER DEFINIZIONE

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



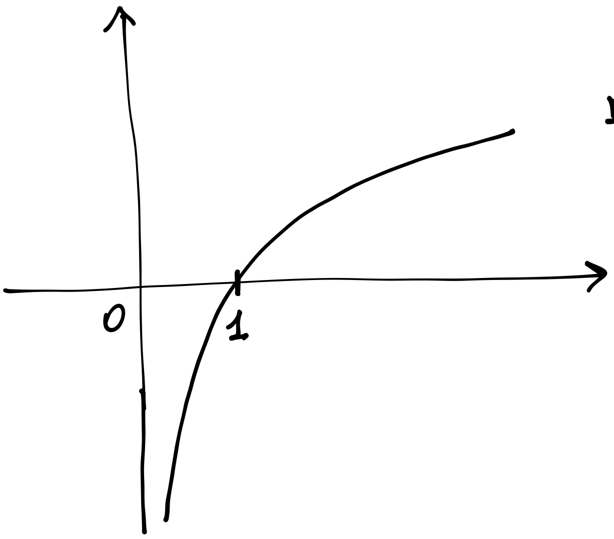
SUCCESSIONE $e^n \longrightarrow +\infty$ per $n \to +\infty$

$$\lim_{n \to \infty} e^{n^2+2n} = e^{+\infty} = +\infty \qquad \lim_{n \to \infty} e^{-n^2} = e^{-\infty} = 0$$

$$\lim_{n \to \infty} e^{\frac{1}{n}} = e^0 = 1$$

32) $$\lim_{n \to \infty} e^{\frac{n^2+1}{n^2-1}} = e^1 = e$$

$$\frac{n^2+1}{n^2-1} = \frac{\cancel{n^2}\left(1 + \overbrace{\frac{1}{n^2}}^{0}\right)}{\cancel{n^2}\left(1 - \underbrace{\frac{1}{n^2}}_{0}\right)} \to 1$$



$y = \ln x$

DOMINIO: $x > 0$

$\ln \equiv \log_e$

LOGARITMO NATURALE

SUCCESSIONE $\ln(n) \longrightarrow +\infty$ per $n \to +\infty$

$$\lim_{n \to \infty} \ln\left(n^2 + n\right) = +\infty$$

$$\ln(+\infty) = +\infty$$

$$\lim_{n \to \infty} \ln\Big(\underbrace{\tfrac{1}{n}}_{\to 0}\Big) = -\infty$$

$$\ln(0) = -\infty$$