FORME INDETERMINATE

ESEMPI

1) Calcolare $\lim_{n\to+\infty} \frac{n^2}{n} = \frac{+\infty}{+\infty}$ F.I.

$$\lim_{n\to+\infty} \frac{n^2}{n} = \lim_{n\to+\infty} \frac{n^{\cancel{2}}}{\cancel{n}} =$$

$$= \lim_{n\to+\infty} n = +\infty$$

2) Calcolare $\lim_{n\to+\infty} \frac{n}{n^2} = \frac{+\infty}{+\infty}$ F.I.

$$\lim_{n\to+\infty} \frac{n}{n^2} = \lim_{n\to+\infty} \frac{\cancel{n}}{n^{\cancel{2}}} =$$

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

3) Calcolare $\lim_{n\to+\infty} \frac{n}{n} = \frac{+\infty}{+\infty}$ F.I.

$$\lim_{n\to+\infty} \frac{n}{n} = \lim_{n\to+\infty} \frac{\cancel{n}}{\cancel{n}} = \lim_{n\to+\infty} 1 = 1$$

ESERCIZI

$$\lim_{n\to+\infty} \frac{5-n}{2n+1} = \frac{5-\infty}{2(+\infty)+1} = \frac{-\infty}{+\infty} \quad \text{F.I.}$$

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

4. $2n^2 + 6n - 1$ $[+\infty]$

5. $-n^3 + 2n^2 - 4$ $[-\infty]$

4) $\lim_{n\to+\infty} (2n^2+6n-1) = 2(+\infty)^2 + 6(+\infty) - 1 = +\infty + \infty - 1 = +\infty$

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

$= -\infty + \infty$ F.I.

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

25. $\sqrt{n^2+n}-\sqrt{n^2+3n}$

$$\lim_{n\to+\infty}\left[\sqrt{n^2+n}-\sqrt{n^2+3n}\right]=+\infty-\infty \quad \text{F.I.}$$

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

$$=\lim_{n\to+\infty}\frac{\cancel{n^2}+n-\cancel{n^2}-3n}{\sqrt{n^2+n}+\sqrt{n^2+3n}}=\lim_{n\to+\infty}\frac{-2n}{\sqrt{n^2+n}+\sqrt{n^2+3n}}=\frac{-\infty}{+\infty} \quad \text{F.I.}$$

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

$$=\lim_{n\to+\infty}\frac{-2\cancel{n}}{\cancel{n}\left(\sqrt{1+\underset{\downarrow 0}{\frac{1}{n}}}+\sqrt{1+\underset{\downarrow 0}{\frac{3}{n}}}\right)}=\frac{-2}{1+1}=\frac{-2}{2}=-1$$

114 Determina il dominio e il segno della funzione

$$f(x) = \log(\ln(-x+1)).$$

Posta $g(x) = 10^x$, calcola la funzione composta $g \circ f$ e determina il grafico di $y = (g \circ f)(x)$.

$[D_f: x < 0;\ f(x) > 0: x < 1 - e;\ (g \circ f)(x) = \ln(-x+1),\ x < 0]$

$\ln(-x+1)$ è definito per $-x+1>0 \Rightarrow x<1$

$\log(\ln(-x+1))$ è definito quando $\ln(-x+1)$ esiste ed è >0

$$\ln(-x+1)>0$$

$$\Downarrow$$

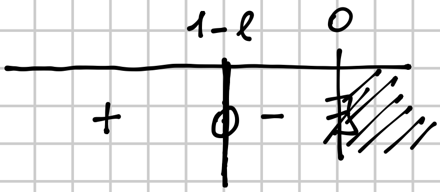
$$-x+1>1 \Rightarrow x<0$$

Quindi $D=(-\infty,0)$

<u>SEGNO</u>

$\log(\ln(-x+1))>0 \Rightarrow \ln(-x+1)>1 \Rightarrow \begin{cases} -x+1>e \\ x<0 \end{cases}$

$\begin{cases} x<1-e \\ x<0 \end{cases}$



$\Downarrow$

$x<1-e$

$g(x)=10^x$ $\qquad f(x)=\log(\ln(-x+1))$

$g:\mathbb{R}\to\mathbb{R}$ $\qquad f:(-\infty,0)\to\mathbb{R}$

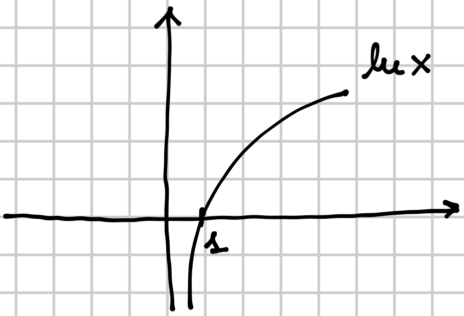
$(g\circ f):(-\infty,0)\to\mathbb{R}$ $\qquad (g\circ f)(x)=g(f(x))=10^{f(x)}=$

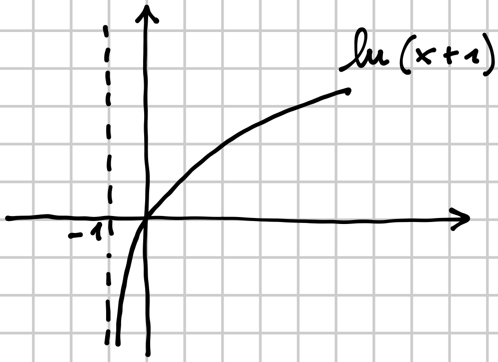
$=10^{\log(\ln(-x+1))}=$

$=\ln(-x+1)$

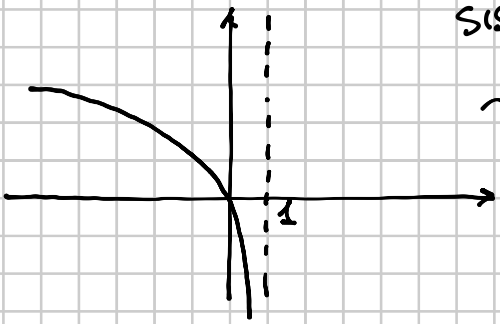
ATTENZIONE! Il dominio <u>non</u> è $(-\infty,1)$, ma $(-\infty,0)$ perché $g\circ f$ è una COMPOSIZIONE

$\ln(-x+1)$





$\ln(-x+1)$



SISTEMIAMO IL DOMINIO!

$(g \circ f)(x) = \ln(-x+1)$