Studio funzione

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1) $f(x) = \sqrt{1+\ln x}$
$1+\ln x \geq 0 \rightarrow \ln x \geq -1 \rightarrow x \geq e^{-1} \rightarrow x \geq \frac{1}{e}$
$\ln x > 0 \rightarrow x > 0$
$\frac{1}{e} > 0$
$\rightarrow \left[\frac{1}{e}, +\infty\right)$

2) $f(x) = x^3 - 3x$
$I = (-1, +1)$
$f'(x) = 3x^2 - 3$
$3x^2 - 3 > 0 \rightarrow 3x^2 > 3 \rightarrow x^2 > 1 \rightarrow x > \pm 1$
+++(-1)----(+1)++++
La funzione è decrescente

3) $f(x) = \begin{cases} \cos x^2 + a \rightarrow x \leq 0 \\ \dfrac{\ln(1+x)}{x+e^x} \rightarrow x > 0 \end{cases}$
$\lim_{x\to 0^+} \frac{\ln 1}{0+1} = \frac{0}{1} = 0$
$\cos x + a = 0$
$\cos(0) = 1$
$1 + a = 0 \rightarrow a = -1$

4) $f(x) = e^{-x^2}$
$f'(x) = -2xe^{-x^2}$
$-2xe^{-x^2} > 0$
$-\frac{2x}{e^{x^2}} > 0$
$-2x > 0 \rightarrow x < 0$
$-e^{x^2} < 0 \rightarrow mai$
++++++(0)-------
0 è massimo assoluto

5) $\lim_{n\to+\infty} (n^2 - n^3 + 3e^{-n} + \cos n^2) \sim \lim_{x\to+\infty} -n^3 + 3e^{-n} = -\infty + 0 = -\infty$

6) $\lim_{n\to+\infty} \frac{\ln(2+n^3) - 5\sqrt{n^2-n} + 2^{-n^4+5n}}{5n + 3\ln n - n\ln n} \sim \frac{2^{-n^4}}{n \ln n} \rightarrow converge$
Ricorda: $-n^4 = -1 * (n^4)$

7) $\lim_{x\to+\infty} n^2 \sin\frac{1}{n+n^2} \sim n^2 * \frac{1}{n+n^2} = n^2 * \frac{1}{n(n+1)} = \frac{n}{n+1} = \frac{n}{n*\left(1+\frac{1}{n}\right)} = \frac{1}{1+\frac{1}{n}} = 1$

8) $\lim_{x\to+\infty} (\ln n - \sqrt{n} + 3e^{-n} + \sin n^2)$
$\sim \ln n - \sqrt{n} + 0$
$\ln n - n^{\frac{1}{2}} \sim -n = -\infty$

9) $\lim_{x\to+\infty} \frac{n^2 + e^{-n} + \ln n}{\ln(1+n) + n^3 - 1} \sim \frac{n^2}{n^3} = \frac{1}{n} = 0$