LECTURE: 2-6 LIMITS AT INFINITY (PART 2)

Intuitive Definition of a Limit at Infinity Let f be a function defined on some interval (a, ∞) or $(-\infty, a)$. Then

$$\lim_{x\to\infty} f(x) = L \quad (\text{or } \lim_{x\to-\infty} f(x) = L)$$

means that the values of $f(x)$ can be made arbitrarily close to L by requiring x to be big enough or

How do deal with limits as $x \to -\infty$:

Example 7: Find the limit.

(a) $\displaystyle\lim_{x\to-\infty} \frac{2x}{\sqrt{x^2+2}}$

(b) $\displaystyle\lim_{x\to-\infty} (5 - 3e^x)$

Example 8: Evaluate the following limits.

(a) $\displaystyle\lim_{x\to\infty} (\sqrt{x^4+6x^2} - x^2)$

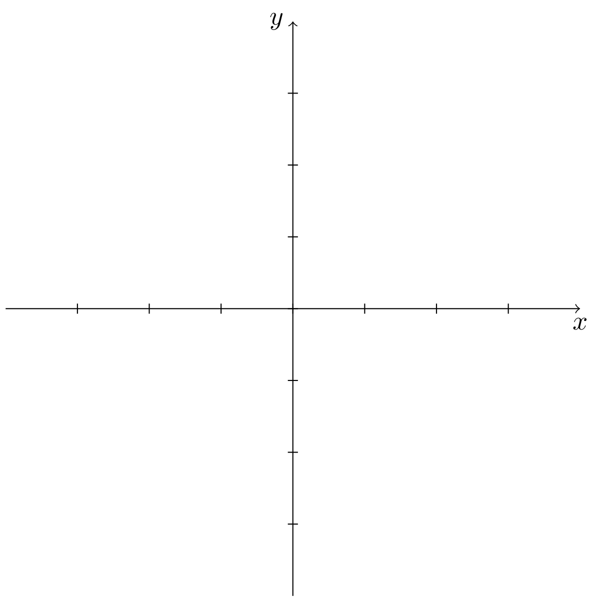
(b) $\displaystyle\lim_{x\to\infty} (\sqrt{x^2+1} - x)$

Example 9: Evaluate the following limits.

(a) $\lim\limits_{x \to 0^-} e^{1/x}$

(b) $\lim\limits_{x \to \infty} e^{-2x} \cos x$

Example 11: Sketch the graph of $y = (x-2)^4(x+1)^3(x-1)$ by finding its intercepts and its limits as $x \to \pm\infty$.



Example 12: Find the horizontal and vertical asymptotes of $f(x) = \dfrac{\sqrt{16x^2+1}}{2x-8}$.