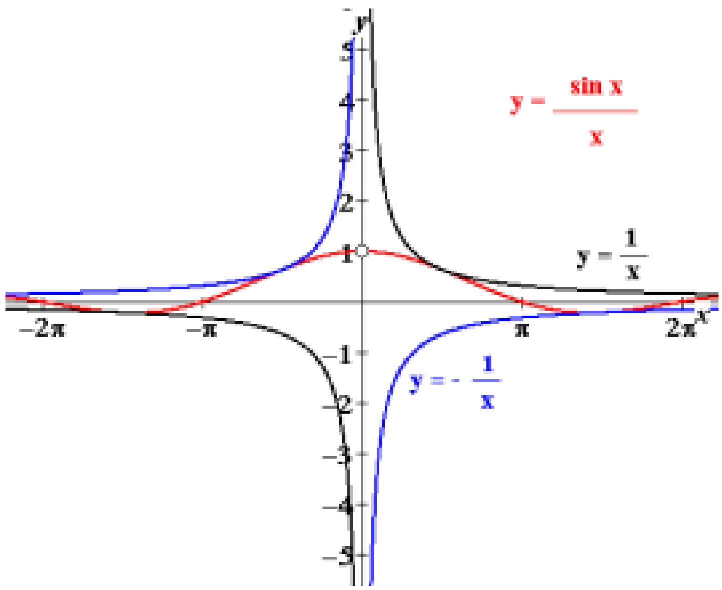
Limits



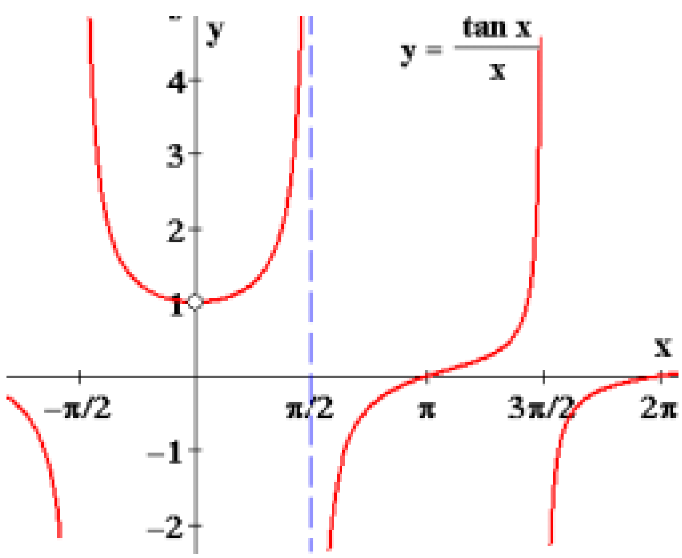
Envelope: $y = \pm \frac{1}{x}$

(1) The curve is symmetric about y axis.

(2) $\lim_{x \to 0} \frac{\sin x}{x} = 1$

$\lim_{x \to \pm\infty} \frac{\sin x}{x} = 0$

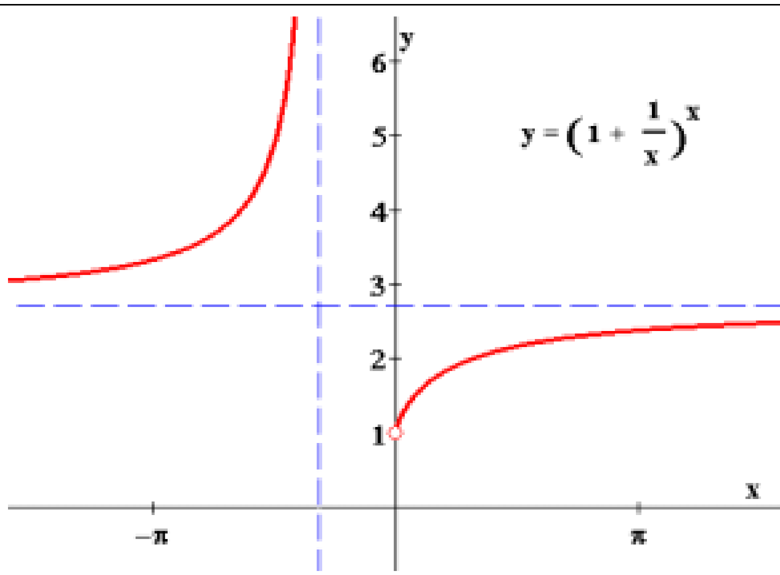
(3) $\lim_{x \to 0} \frac{\sin mx}{nx} = \frac{m}{n}$



(1) The curve is symmetric about y axis.

(2) $\lim_{x \to 0} \frac{\tan x}{x} = 1$

(3) $\lim_{x \to \frac{\pi}{2} \pm 0} \frac{\tan x}{x} = \mp\infty$



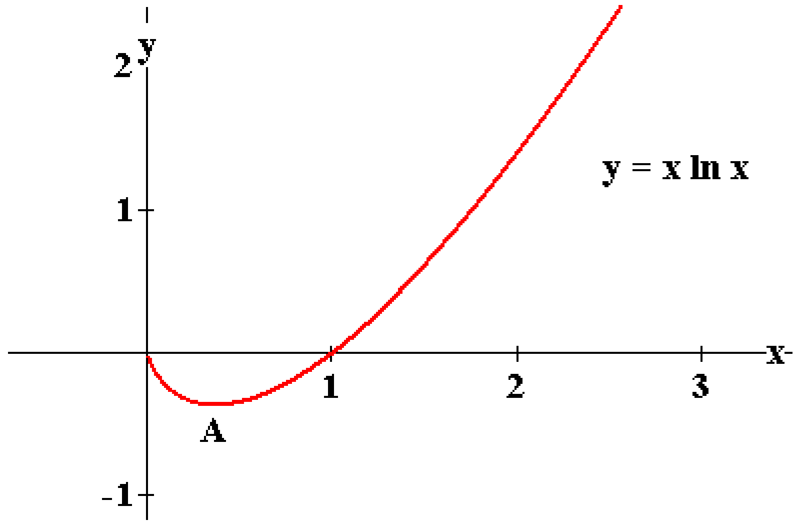
(1) Asymptotes:

y = e and x = -1

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

$\lim_{x \to 0+} \left(1 + \frac{1}{x}\right)^x = 1$

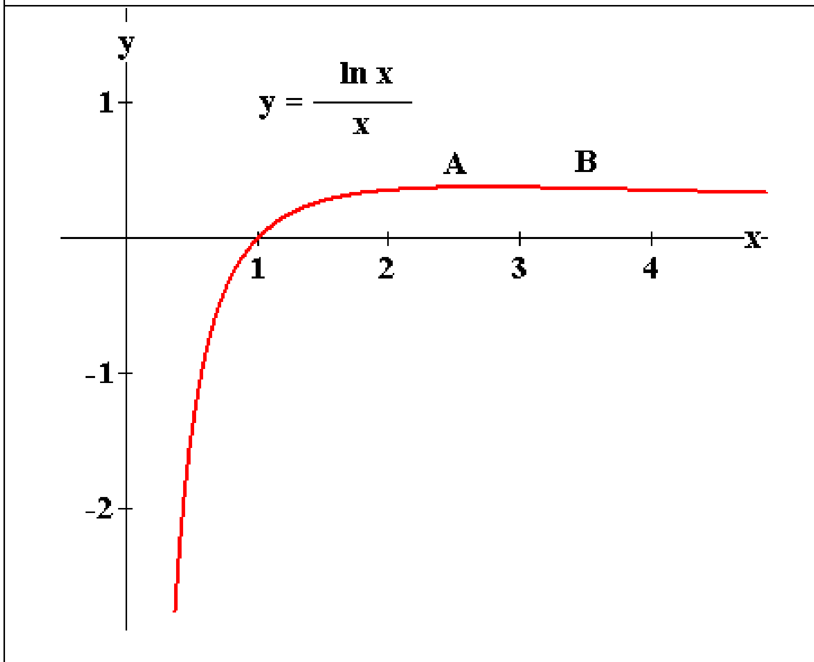
$\lim_{x \to (-1)^-} \left(1 + \frac{1}{x}\right)^x = +\infty$



(1) **Min Point at A** $\left(\frac{1}{e}, -\frac{1}{e}\right)$

(2) $\lim\limits_{x \to 0} x \ln x = 0$

(3) **Note :** $\lim\limits_{x \to 0+} x^x = 1$



(1) **Max Point at A** $\left(e, \frac{1}{e}\right)$

(2) **Inflexion Point at B**

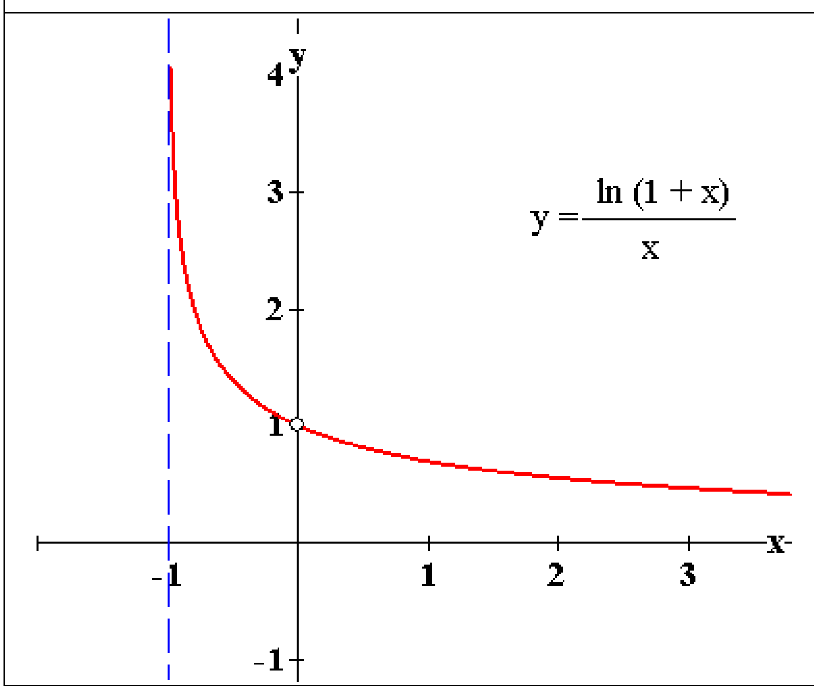
$\left(e^{\frac{3}{2}}, \frac{3}{2} e^{-\frac{3}{2}}\right)$

(3) **Asymptotes :**

y = 0 and x = 0

(4) $\lim\limits_{x \to +\infty} \frac{\ln x}{x} = 0$, $\lim\limits_{x \to 0} \frac{\ln x}{x} = -\infty$

(5) **Note :** $\lim\limits_{x \to +\infty} x^{\frac{1}{x}} = 1$



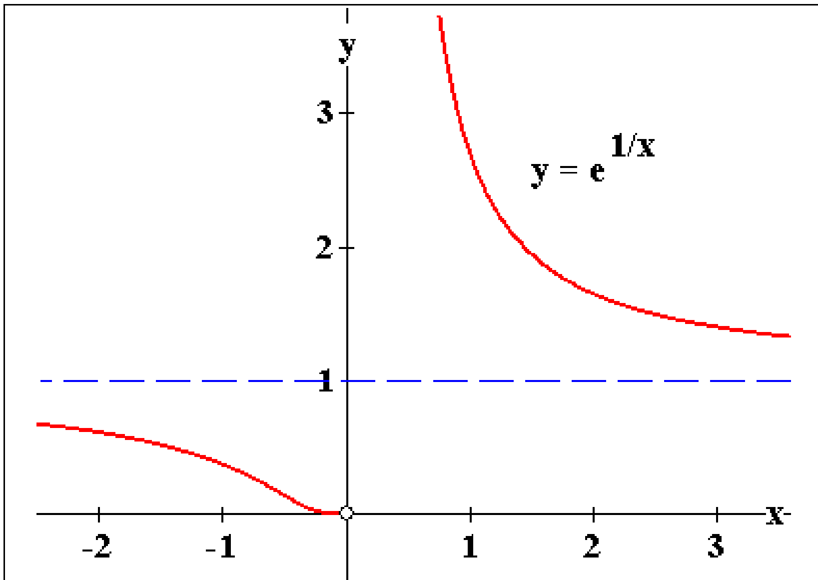
(1) **Asymptotes :**

y = 0 and x = -1

(2) $\lim\limits_{x \to 0} \frac{\ln(1+x)}{x} = 1$

(3) $\lim\limits_{x \to +\infty} \frac{\ln(1+x)}{x} = 0$

(4) $\lim\limits_{x \to -1^+} \frac{\ln(1+x)}{x} = +\infty$



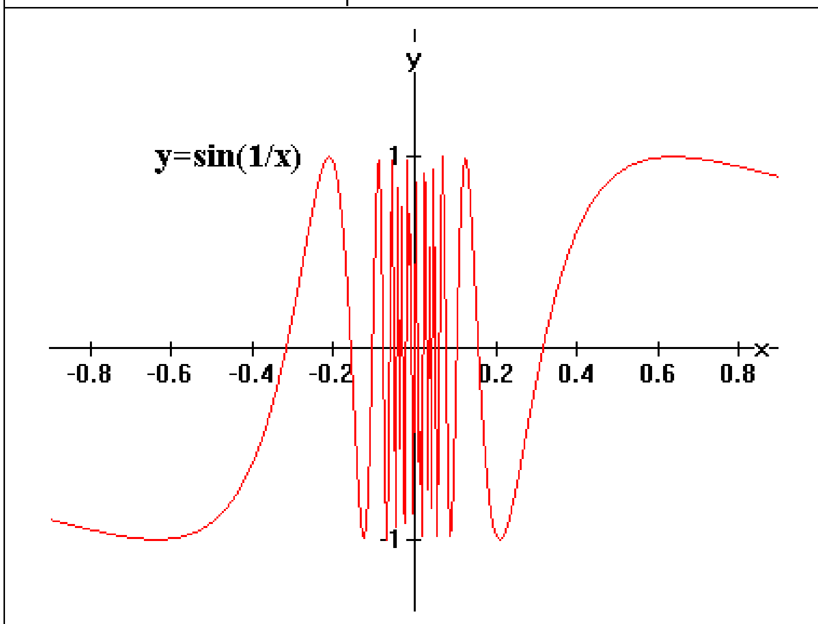
(1) Asymptotes :

y = 1 and x = 0

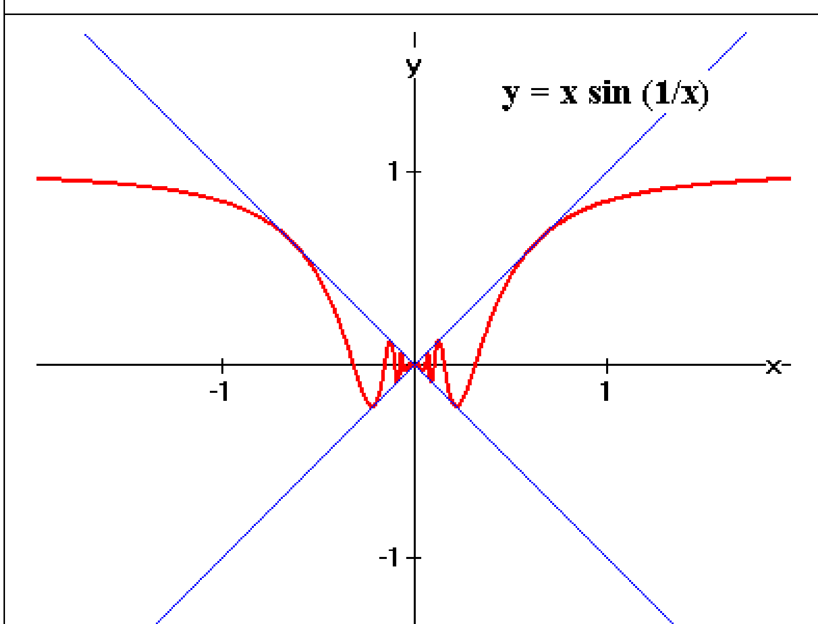
(2) $\lim_{x\to 0^-} e^{\frac{1}{x}} = 0$

(3) $\lim_{x\to 0^+} e^{\frac{1}{x}} = +\infty$

(4) $\lim_{x\to \pm\infty} e^{\frac{1}{x}} = 1$



(1) $\lim_{x\to 0} \sin\frac{1}{x}$ **does not exist.**



Envelope : y = ± x

(1) $\lim_{x\to 0} x\sin\frac{1}{x} = 0$