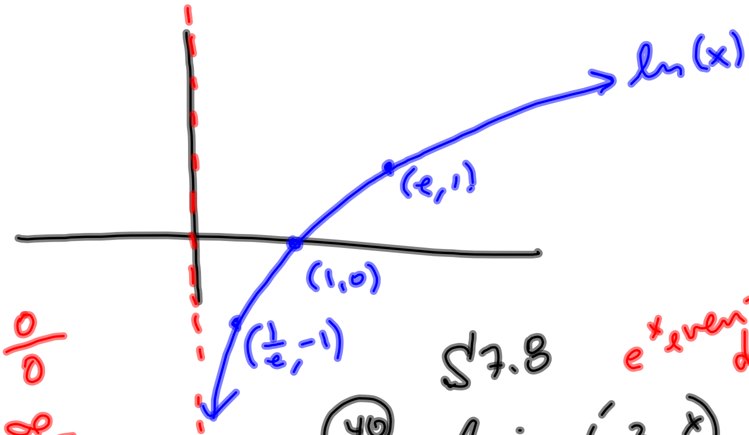

$\frac{0}{0}$ $\frac{\infty}{\infty}$ 0^∞ $\frac{0}{0}$ 1^∞

§7.8

e^x eventually dominates.

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

$\infty \cdot 0$ $\frac{0}{0}$

L'H
$$= \lim_{x\to-\infty}\frac{e^x}{-2x^{-3}} = \lim_{x\to-\infty}\frac{e^x}{\frac{-2}{x^3}}$$ No end in sight!

$$= \lim_{x\to-\infty}\frac{x^2}{e^{-x}} \overset{L'H}{=} \lim_{x\to-\infty}\frac{2x}{-e^{-x}} \overset{L'H}{=} \lim_{x\to-\infty}\frac{2}{e^{-x}} = \lim_{x\to-\infty}e^x = 0$$

$\frac{\infty}{\infty}$ $\frac{-\infty}{-\infty}$

See? e^x dominated.

$$\lim_{x\to\infty}\left(\frac{2x-3}{2x+5}\right)^{2x+1}$$

1^{∞}

$$y=\left(\frac{2x-3}{2x+5}\right)^{2x+1}$$

$$\ln(y)=\overset{\infty}{(2x+1)}\cdot\overset{0}{\ln\left(\frac{2x-3}{2x+5}\right)}$$

$$=\frac{\ln\left(\frac{2x-3}{2x+5}\right)}{\frac{1}{2x+1}}=\frac{\ln(2x-3)-\ln(2x+5)}{\frac{1}{2x+1}}$$

$(2x+1)^{-1}$

We apply L'Hôpital to the limit as $x\to\infty$:

$-(2x+1)^{-2}(2)$

$$\lim_{x\to\infty}\frac{\frac{2}{2x-3}-\frac{2}{2x+5}}{-(2x+1)^{-2}(2)}=\lim_{x\to\infty}\frac{\frac{2}{2x-3}-\frac{2}{2x+5}}{\frac{-2}{(2x+1)^2}}$$

owie!

$$=\lim_{x\to\infty}-\frac{2x+5-(2x-3)}{(2x-3)(2x+5)}\cdot(2x+1)^2=\lim_{x\to\infty}-\frac{8(2x+1)^2}{(2x-3)(2x+5)}=-8$$

$$\lim_{x\to\infty}\ln(y)=-8$$

$$\therefore\ \lim_{x\to\infty}y=e^{-8}=\frac{1}{e^{8}}\ !?$$

Sep 12-12:46 PM