$$\log_b u = \frac{1}{u(\ln b)}\,du$$

8.2

15 $\displaystyle\lim_{x\to\infty} \frac{\ln(x+1)}{\log_2 x}$

$$\lim_{x\to\infty} \frac{\frac{1}{x+1}}{\frac{1}{(\ln 2)x}}$$

$$\lim_{x\to\infty} \frac{(\ln 2)\,x}{x+1} = \boxed{\ln 2}$$

$$\lim_{x\to\infty} \frac{x^2 + \cancel{4x+7}}{5x^2 \cancel{-1}}$$

$$\frac{\cancel{x^2}}{5\cancel{x^2}} = \frac{1}{5}$$

$$\cancel{\frac{d}{dx} 3x^4}$$

$$12x^3$$

13 $\displaystyle\lim_{x\to\pi} \frac{\csc x}{1+\cot x}$

$$\lim_{x\to\pi} \frac{\cancel{+\csc x}\cot}{+\csc^2 x}$$

$$\lim_{x\to\pi} \frac{\cot}{1} \cdot \frac{1}{+\csc x}$$

$$\lim_{x\to\pi} \frac{\cos x}{\sin x} + \frac{1}{\frac{1}{\sin x}}$$

$$\lim_{x\to\pi} \frac{\cos x}{\cancel{\sin x}} \cdot +\cancel{\sin x}$$

$$\lim_{x\to\pi} +\cos x = -1$$

21 $\displaystyle\lim_{x\to 0} (e^x + x)^{\frac{1}{x}} = L$

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

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

$$\lim_{x\to 0} \frac{\ln(e^x + x)}{x} = \ln L$$

$$\cancel{\lim_{x\to 0} \frac{\frac{1}{e^x}[e^x] + 1}{1}}$$

$$\lim_{x\to 0} \frac{\frac{1}{e^x + x}[e^x + 1]}{1} = \ln L$$

$$\frac{\frac{1}{1+0}[1+1]}{1} = \ln L$$

$$2 = \ln L$$

$$\boxed{e^2 = L}$$

8.2

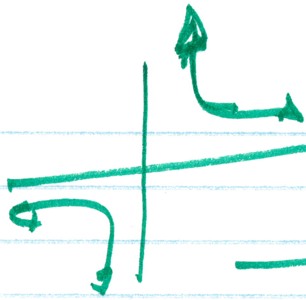
17 $\lim\limits_{x \to 0^+} x \ln x$

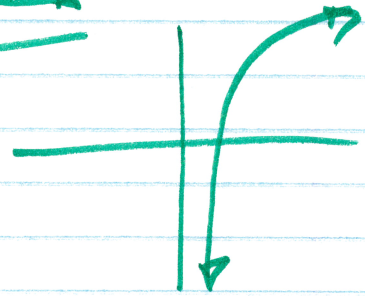
$$\lim_{x \to 0^+} \frac{\ln x}{\frac{1}{x}} \quad \frac{-\infty}{\infty}$$

$$\lim_{x \to 0^+} \frac{\frac{1}{x}}{-\frac{1}{x^2}}$$

$$\lim_{x \to 0^+} \frac{-x^2}{x}$$

$$\lim_{x \to 0^+} -x = \boxed{0}$$





$$\int_0^5$$

$$\int_{-\infty}^{1.7}$$

8.2

(13) $\lim_{x \to \pi} \frac{\csc x}{1+\cot x}$

$\lim_{x \to \pi} \frac{-\csc x \cot x}{-\csc^2 x}$

$\lim_{x \to \pi} \frac{\cot x}{\csc x} \rightarrow \lim_{x \to \pi} \frac{\sin x}{\tan x} \quad \frac{\cancel{\sin x}}{1} \cdot \frac{\cos x}{\cancel{\sin x}}$

$\lim_{x \to \pi} \cos x = \boxed{-1}$

---

(15) $\lim_{x \to \infty} \frac{\ln(x+1)}{\log_2 x}$

$\lim_{x \to \infty} \frac{\frac{1}{x+1}}{\frac{1}{x \ln 2}}$

$\lim_{x \to \infty} \frac{x \ln 2}{x+1} = \boxed{\ln 2}$