$\frac{1}{0} = \infty$

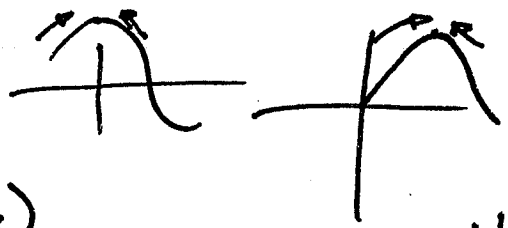
8.2

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

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

$\lim_{x \to \pi} \frac{\cot x}{\csc x} = \frac{\frac{\cos x}{\sin x}}{\frac{1}{\sin x}} = \frac{\cos x}{\sin x} \cdot \frac{\sin x}{1} = \cos x$

-1

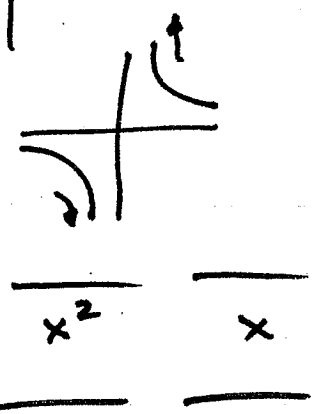


19) $\lim_{x \to 0^+} (\csc x - \cot x + \cos x)$

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

$\lim_{x \to 0^+} \left(\frac{1 - \cos x + \cos x \sin x}{\sin x} \right)$ $\quad f \quad g$

$\lim_{x \to 0^+} \left(\frac{\sin x + -\sin^2 x + \cos^2 x}{\cos x} \right)$



$\frac{x^2}{2x}$ $\quad \frac{x}{1}$

1

15) $\lim_{x \to \infty} \frac{\ln(x+1)}{\log_2 x}$ $\quad \infty$ $\quad \infty$ $\quad (\log x)/(\log 2)$

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

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

$\lim_{x \to \infty} \frac{x^2 + 1}{3x^2 - 4x + 5}$

$\frac{1}{3}$

8.2

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

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

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

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

$\lim_{x\to 0} \frac{e^x + 1}{e^x + x} = \frac{2}{1} = 2 = \ln L$

$e^2 = L$

43) $\lim_{x\to\infty} (1+2x)^{\frac{1}{2\ln x}} = L$

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

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

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

$\lim_{x\to\infty} \frac{\frac{1}{1+2x}[2]}{\frac{1}{x}} = \ln L$

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

$\frac{1}{2} = \ln L$

$e^{1/2}$ $\sqrt{e}$

8.2

51) $\lim_{x \to 1} \dfrac{\int_1^x \cos t \, dt}{x^2 - 1}$

$\lim_{x \to 1} \dfrac{\cos x}{2x} = \dfrac{\cos 1}{2}$

55) $f(x) = \begin{cases} \dfrac{9x - 3\sin 3x}{5x^3}, & x \neq 0 \\ c, & x = 0 \end{cases}$

$3\cos 3x \; [3]$

$\lim_{x \to 0} \dfrac{9x - 3\sin 3x}{5x^3}$

$\lim_{x \to 0} \dfrac{9 - 9\cos 3x}{15x^2}$

$\lim_{x \to 0} \dfrac{27 \sin 3x}{30x}$

$\lim_{x \to 0} \dfrac{81 \cos 3x}{30} = \dfrac{81}{30}$

$\dfrac{27}{10} = c$

37) $\lim_{y \to \pi/2} (\tfrac{\pi}{2} - y)\tan y \to (\tfrac{\pi}{2} - y) \cdot \dfrac{1}{\cot y}$

$\lim_{y \to \pi/2} \dfrac{\frac{\pi}{2} - y}{\cot y}$

$\lim_{y \to \pi/2} \dfrac{-1}{-\csc^2 y} = 1$

$\dfrac{-1}{-\csc^2(\frac{\pi}{2})}$

$\sin \tfrac{\pi}{2} = 1$

$\csc \tfrac{\pi}{2} = 1$

$\csc^2 \tfrac{\pi}{2} = 1$

$-\csc^2 \tfrac{\pi}{2} = -1$