30
35
41

$\tan^{-1}\infty$

$$\lim_{x\to\infty} \frac{\tan^{-1}x - \frac{\pi}{2}}{1/x} \quad (1/x = x^{-1}) = \frac{\frac{\pi}{2}-\frac{\pi}{2}}{\frac{1}{\infty}} = \frac{0}{0}$$

$$\lim_{x\to\infty} \frac{\frac{1}{x^2+1}\cdot -\frac{x^2}{1}}{\frac{-1}{x^2}} \quad \left(f' = -x^{-2}\right)$$

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

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

$$\lim_{x\to 2} \frac{x^2-4x+4}{\sin^2(\pi x)} = \frac{4-8+4}{0} = \frac{0}{0}$$

$$\lim_{x\to 2} \frac{2x-4}{2\sin(\pi x)\cdot\cos(\pi x)\cdot\pi} = \frac{4-4}{2\cdot 0\cdot 1\cdot\pi} = \frac{0}{0}$$

$$2\pi\left[\sin(\pi x)\cdot\cos(\pi x)\right]$$

$$\lim_{x\to 2} \frac{2}{2\pi\left[\sin(\pi x)\cdot -\sin(\pi x)\cdot\pi + \cos(\pi x)\cdot\cos(\pi x)\pi\right]}$$

$$\lim_{x\to 2} \frac{\cancel{2}}{\cancel{2}\pi^2\left[-\sin^2(\pi x)+\cos^2(\pi x)\right]}$$

$$= \frac{1}{\pi^2\left[0+1\right]} = \frac{1}{\pi^2}$$

9)

$$\lim_{x\to\infty} \frac{\ln(3x+5)}{\ln(7x+3)+1} = \frac{\ln(\infty)}{\ln(\infty)+1} = \frac{\infty}{\infty}$$

$$\lim_{x\to\infty} \frac{\frac{1}{3x+5}\cdot 3}{\frac{1}{7x+3}\cdot 7}$$

$$\lim_{x\to\infty} \frac{\frac{3}{3x+5}}{\frac{7}{7x+3}} \qquad \frac{7x+3}{7}$$

$$\lim_{x\to\infty} \frac{3(7x+3)}{7(3x+5)}$$

$$\frac{3}{7}\lim_{x\to\infty} \frac{7}{3}$$

$$= \frac{3}{7}\cdot\frac{7}{3} = 1$$

October 17, 2022