

8.3

25) $\lim_{x \rightarrow \infty} \frac{\log_2 x^2}{\ln x}$

$\lim_{x \rightarrow \infty} \frac{2 \log_2 x}{\ln x}$

$\lim_{x \rightarrow \infty} \frac{2 \cdot \frac{1}{x} \cdot \frac{1}{\ln 2}}{\frac{1}{x}} = \frac{2}{\ln 2}$

$e^{-\infty} = \frac{1}{e^{\infty}} = 0$



27) $\lim_{x \rightarrow \infty} \frac{e^{-x}}{\ln x} = \lim_{x \rightarrow \infty} \frac{1}{e^x \ln x} = 0$

31) $\lim_{x \rightarrow \infty} \frac{\sqrt{10x+1}}{\sqrt{x}} = \sqrt{10} \frac{\sqrt{10} \sqrt{x}}{\sqrt{x}} \quad \lim_{x \rightarrow \infty} \frac{\sqrt{x+1}}{\sqrt{x}} = 1$

33) $\lim_{x \rightarrow \infty} \frac{\sqrt{9x+2x}}{3^x} = 1 \quad \lim_{x \rightarrow \infty} \frac{9^x}{2^x} = \lim_{x \rightarrow \infty} \left(\frac{9}{2}\right)^x$

$\lim_{x \rightarrow \infty} \frac{\sqrt{9x-4x}}{3^x} = 1$

13) $\lim_{x \rightarrow \infty} \frac{\log \sqrt{x}}{\ln x} = \frac{\frac{1}{2} \log x}{\ln x}$

$\lim_{x \rightarrow \infty} \frac{\frac{1}{2} \frac{1}{x} \ln 10}{\frac{1}{x}} = \frac{1}{2 \ln 10}$

29) $e^x, x^x, (\ln x)^x, e^{x/2}$

$\lim_{x \rightarrow \infty} \frac{x^x}{(\ln x)^x} = \lim_{x \rightarrow \infty} \left(\frac{x}{\ln x}\right)^x = \infty$

$\lim_{x \rightarrow \infty} \frac{1}{x^x} = 0$
 $\lim_{x \rightarrow \infty} \frac{1}{x^x} = 0$

$x^x > (\ln x)^x$

8.3

$$\lim_{x \rightarrow \infty} \frac{(\ln x)^x}{e^x} = \lim_{x \rightarrow \infty} \left(\frac{\ln x}{e} \right)^x = \infty$$

$$(\ln x)^x > e^x$$

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

$$e^x > e^{x/2}$$

$$15 \quad \lim_{x \rightarrow \infty} \frac{e^x}{\sqrt{1+x^4}} \approx \lim_{x \rightarrow \infty} \frac{e^x}{x^2} \quad \lim_{x \rightarrow \infty} \frac{e^x}{\sqrt{1+x^4}} = \infty$$

$$\lim_{x \rightarrow \infty} \frac{e^x}{\sqrt{x^4}}$$

$$\lim_{x \rightarrow \infty} \frac{e^x}{2x}$$

$$\lim_{x \rightarrow \infty} \frac{e^x}{2^{1/2} x} = \infty$$