

ainoasteen korkeimman potenssin termi ($a > 1$ x^m = positiivinen/pohti)
 a : m määrittäjä

8.6 a) $\lim_{x \rightarrow \infty} \frac{1}{7^x} = \frac{1}{7^\infty} = \frac{1}{\infty} = 0$

b) $\lim_{x \rightarrow -\infty} \left(\frac{7}{3}\right)^{2x} = \lim_{t \rightarrow \infty} \left(\frac{7}{3}\right)^{-2t} = \lim_{t \rightarrow \infty} \left(\frac{3}{7}\right)^{2t} = 0$
 $x = -t$ $-1 < < 1$

8.10 a) $f(x) = \frac{6x^2 - 9x}{2x^2 + 9} = \frac{x^2(6 - \frac{9}{x})}{x^2(2 + \frac{9}{x^2})} = \frac{6 - \frac{9}{x}}{2 + \frac{9}{x^2}} \xrightarrow{x \rightarrow \pm\infty} \frac{6-0}{2+0} = \frac{6}{2} = 3$

b) $f(x) = \frac{2x^3 - 7}{5x^2 + 2} = \frac{x^2(2x - \frac{7}{x^2})}{x^2(5 + \frac{2}{x^2})} = \frac{2x - \frac{7}{x^2}}{5 + \frac{2}{x^2}}$
 $\xrightarrow{x \rightarrow \infty} \frac{2 \cdot \infty - 0}{5 + 0} = \frac{\infty}{5} = \infty$
 $\xrightarrow{x \rightarrow -\infty} \frac{2 \cdot (-\infty) - 0}{5 + 0} = \frac{-\infty}{5} = -\infty$

8.20 $\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^x = e$

a) $\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^{-x} = \lim_{x \rightarrow \infty} \left[\left(1 + \frac{1}{x}\right)^x \right]^{-1} = e^{-1} = \frac{1}{e}$

TAI: $\left(1 + \frac{1}{x}\right)^{-x} = \frac{1}{\left(1 + \frac{1}{x}\right)^x} \xrightarrow{x \rightarrow \infty} \frac{1}{e}$

b) $\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^{2x} = \lim_{x \rightarrow \infty} \left[\left(1 + \frac{1}{x}\right)^x \right]^2 = e^2$

c) $\lim_{x \rightarrow \infty} \left(1 + \frac{1}{2x}\right)^x = \lim_{x \rightarrow \infty} \left[\left(1 + \frac{1}{2x}\right)^{2x} \right]^{\frac{1}{2}} = e^{\frac{1}{2}} = \sqrt{e}$

8.19 a) $f(x) = \frac{9 \sin 6x}{x+2} \xrightarrow{x \rightarrow \infty} 0$

b) $f(x) = x e^{\sin x} \geq x e^{-1} \xrightarrow{x \rightarrow \infty} \infty$ ei rajoitettu, epäoleellinen rajoitettu

$e^{-1} = \frac{1}{e} \approx 0,368$
 $e^1 = e \approx 2,718$
 $\Rightarrow 0,368 \leq e^{\sin x} \leq 2,718$