## §4.7

#1) a) $\lim_{x\to 2} \frac{x^2-4}{x^2+2x-8} = \lim_{x\to 2} \frac{(x+2)(x-2)}{(x+4)(x-2)} = \lim_{x\to 2} \frac{x+2}{x+4} = \frac{2}{3}$

$\lim_{x\to 2} \frac{x^2-4}{x^2+2x-8} = \lim_{x\to 2} \frac{2+x^2}{x^2} = \frac{2}{3}$ ✓

b) $\lim_{x\to\infty} \frac{2x-5}{3x+7} = \lim_{x\to\infty} \frac{2-5/x}{3+7/x} = \frac{2}{3}$

$\lim_{x\to\infty} \frac{2x-5}{3x+7} = \lim_{x\to\infty} \frac{2}{3} = \frac{2}{3}$ ✓

#10) $\lim_{x\to 0^+} \frac{\sin x}{x^2} = \lim_{x\to 0^+} \frac{\cos x}{2x} = \lim_{x\to 0^+} \frac{1}{2x} = \infty$

#15) $\lim_{x\to\infty} \frac{x^{100}}{e^x} = \lim_{x\to\infty} \frac{100x^{99}}{e^x} = \cdots = \lim_{x\to\infty} \frac{100!}{e^x} = 0$

#27) let $y = \lim_{x\to 0} (e^x+x)^{1/x}$

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

$= \frac{1}{1}\cdot(1+1) = 2$

$\ln y = 2 \Rightarrow y = \boxed{e^2}$

#60) ⓐ $\lim_{x\to 0} \frac{x^2 \sin 1/x}{\sin x} = \lim_{x\to 0} \frac{2x\sin\frac{1}{x} + x^2\left(\frac{-1}{x^2}\right)\cos\frac{1}{x}}{\cos x}$

$= \lim_{x\to 0} \frac{2x\sin 1/x - \cos\frac{1}{x}}{\cos x}$ ← D.N.E. because of $\cos\frac{1}{x}$ term.

ⓑ $\lim_{x\to 0} \frac{x^2\sin 1/x}{\sin x} = \lim_{x\to 0} \left(\frac{x}{\sin x}\right)\cdot x\sin\frac{1}{x} = \lim_{x\to 0} x\sin\frac{1}{x} = \boxed{0}$