Activity – L'Hopital's Rule

Each of the limits below is of indeterminate form. State which form. Then find the limit.

a) $\lim\limits_{x \to \infty} \dfrac{e^{7x}}{5x}$

b) $\lim\limits_{x \to 0} \dfrac{x^3}{x - \sin x}$

c) $\lim\limits_{x \to 0} \dfrac{\sinh(x) - x}{x^3}$

d) $\lim\limits_{x \to \infty} \dfrac{3x + 1}{5x - 7}$

e) $\lim\limits_{x \to 0+} x \ln x$

f) $\lim\limits_{x \to 0+} x^x$

g) $\lim\limits_{x \to \infty} \left(1 + \dfrac{2}{x}\right)^x$

h) $\lim\limits_{x \to \infty} x^3 e^{-x}$

i) $\lim\limits_{x \to \infty} \dfrac{2x + 5}{2\sqrt{x^2 + 5x + 5}}$

j) $\lim\limits_{x \to 0} x \csc x$

k) $\lim\limits_{x \to 0} \dfrac{1 - \cos 3x}{8x^2}$