

Directions: Show all work on a separate sheet of paper for full credit.

1. Given that  $\lim_{x \rightarrow a} f(x) = 0$ ,  $\lim_{x \rightarrow a} g(x) = 0$ ,  $\lim_{x \rightarrow a} h(x) = 1$ ,  $\lim_{x \rightarrow a} p(x) = \infty$ , and  $\lim_{x \rightarrow a} q(x) = \infty$ , determine which of the limits are indeterminate forms.

(a)  $\lim_{x \rightarrow a} \frac{f(x)}{g(x)}$  (Y)

(d)  $\lim_{x \rightarrow a} [f(x)p(x)]$  (Y)

(h)  $\lim_{x \rightarrow a} [f(x)]^{g(x)}$  (Y)

(b)  $\lim_{x \rightarrow a} \frac{f(x)}{p(x)}$  (N)

(e)  $\lim_{x \rightarrow a} [h(x)p(x)]$  (N)

(i)  $\lim_{x \rightarrow a} [h(x)]^{p(x)}$  (Y)

(c)  $\lim_{x \rightarrow a} \frac{p(x)}{q(x)}$  (Y)

(f)  $\lim_{x \rightarrow a} [p(x) + q(x)]$  (N)

(j)  $\lim_{x \rightarrow a} [{}^{q(x)}\sqrt{p(x)}]$  (Y)

(g)  $\lim_{x \rightarrow a} [p(x) - q(x)]$  (Y)

2. Evaluate the limits.

(a)  $\lim_{x \rightarrow 3} \frac{x - 3}{x^2 - 9}$   $\frac{1}{6}$

(b)  $\lim_{x \rightarrow 0} \frac{e^{2x} - 1}{\sin(x)}$  2

(c)  $\lim_{x \rightarrow \infty} \frac{\ln(\sqrt{x})}{x^2}$  0

(d)  $\lim_{x \rightarrow 1} \frac{x^8 - 1}{x^5 - 1}$   $\frac{8}{5}$

(e)  $\lim_{x \rightarrow 0} \frac{e^x - 1 - x}{x^2}$   $\frac{1}{2}$

(f)  $\lim_{x \rightarrow 0} \frac{\sin^{-1}(x)}{x}$  1

(g)  $\lim_{x \rightarrow 0^+} \left( \frac{1}{x} - \frac{1}{e^x - 1} \right)$   $\frac{1}{2}$

(h)  $\lim_{x \rightarrow 1^+} x^{1/(1-x)}$   $e^{-1}$

(i)  $\lim_{x \rightarrow \infty} \frac{x + x^2}{1 - 2x^2}$   $-\frac{1}{2}$

(j)  $\lim_{x \rightarrow \infty} \frac{(\ln x)^2}{x}$  0

(k)  $\lim_{x \rightarrow \infty} x^3 e^{-x^2}$  0