MATH 230 NAME:

6.8

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

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

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

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

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

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

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

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

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

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

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

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

2. Evaluate the limits.

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

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

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

   (d) $\displaystyle\lim_{x\to 1} \frac{x^8-1}{x^5-1}$ $\qquad \frac{8}{5}$

   (e) $\displaystyle\lim_{x\to 0} \frac{e^x-1-x}{x^2}$ $\qquad \frac{1}{2}$

   (f) $\displaystyle\lim_{x\to 0} \frac{\sin^{-1}(x)}{x}$ $\qquad 1$

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

   (h) $\displaystyle\lim_{x\to 1^+} x^{1/(1-x)}$ $\qquad e^{-1}$

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

   (j) $\displaystyle\lim_{x\to \infty} \frac{(\ln x)^2}{x}$ $\qquad 0$

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

   (l) $\displaystyle\lim_{x\to \infty} x\sin(\pi/x)$ $\qquad \pi$

   (m) $\displaystyle\lim_{x\to 0} \frac{e^x-e^{-x}-2x}{x-\sin x}$ $\qquad 2$

(n) $\lim_{x \to 0^+} (1+4x)^{\cot x}$ e^4

(o) $\lim_{x \to \infty} x^{e^{-x}}$ 1