SECTION 4.6 **Math 1000 Worksheet** FALL 2025

For practice only. Not to be submitted.

1. Use l'Hôpital's Rule to evaluate each of the following limits.

   (a) $\displaystyle \lim_{x \to 0} \frac{6^x - 2^x}{x}$

   (b) $\displaystyle \lim_{x \to 0^+} \frac{1 - \cos\left(\sqrt{x}\right)}{x}$

   (c) $\displaystyle \lim_{x \to 0} \frac{\sin(mx)}{\sin(nx)}$, where m and n are constants

   (d) $\displaystyle \lim_{x \to \infty} \frac{\ln(1 + e^{2x})}{x}$

   (e) $\displaystyle \lim_{x \to \infty} \frac{[\ln(x)]^3}{x^2}$

   (f) $\displaystyle \lim_{x \to \infty} \frac{x^2 + 1}{x \ln(x)}$

   (g) $\displaystyle \lim_{x \to \frac{\pi}{2}^-} \sec(7x)\cos(3x)$

   (h) $\displaystyle \lim_{x \to 1} \left[\frac{1}{\ln(x)} - \frac{1}{x - 1} \right]$

   (i) $\displaystyle \lim_{x \to 0^+} [\sin(x)]^{\tan(x)}$

   (j) $\displaystyle \lim_{x \to \infty} (x + e^x)^{\frac{1}{x}}$

   (k) $\displaystyle \lim_{x \to 0} [\cos(3x)]^{\frac{5}{x}}$

   (ℓ) $\displaystyle \lim_{x \to \infty} \left(1 + \frac{a}{x}\right)^{bx}$, where a and b are constants