

**MAT 136 (Calculus I) Prof. Swift**  
**In-class worksheet: L'Hospital's Rule and Indeterminate Forms**

1 a. (There are many correct answers.) Find two functions  $f$  and  $g$  such that

$$\lim_{x \rightarrow \infty} f(x) = \infty, \quad \lim_{x \rightarrow \infty} g(x) = \infty, \quad \text{and} \quad \lim_{x \rightarrow \infty} (f(x) - g(x)) = 4.$$

1 b. (There are many correct answers.) Find two functions  $f$  and  $g$  such that

$$\lim_{x \rightarrow \infty} f(x) = \infty, \quad \lim_{x \rightarrow \infty} g(x) = \infty, \quad \text{and} \quad \lim_{x \rightarrow \infty} (f(x) - g(x)) = \infty.$$

2. Evaluate these two limits, using L'Hospital's rule if appropriate

$$\lim_{x \rightarrow 0} \frac{\cos(x) - 1}{x^2}, \quad \lim_{x \rightarrow 0} \frac{\cos(x)}{x^2 - 1}$$