

*University of Lethbridge*  
Department of Mathematics and Computer Science  
**MATH 1560 - Tutorial #2**  
Monday, January 22

Some additional practice (copy these into your notes but do not submit anything):

1. Use algebraic manipulation (if necessary) to evaluate:

(a)  $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x^3 - 8}$

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

(c)  $\lim_{x \rightarrow 4} \frac{x - 4}{\sqrt{x} - 2}$

2. Evaluate these limits involving trig functions:

(a)  $\lim_{x \rightarrow 0} \frac{\tan(2x)}{x}$

(b)  $\lim_{x \rightarrow \pi/6} \frac{\sin(x) - \frac{1}{2}}{x - \pi/6}$

(c)  $\lim_{x \rightarrow \infty} \frac{\sin(x)}{x}$

3. Challenge problem: evaluate  $\lim_{x \rightarrow 1} \frac{\sin(x - 1)}{x^2 - 3x + 2}$

Evaluate the following limits. Circle **up to 4** limits that you would especially like feedback on.

1.  $\lim_{x \rightarrow 3} \frac{x^2 - 9}{x^2 - 5x + 6}$

2.  $\lim_{x \rightarrow 2} \frac{\frac{1}{x} - \frac{1}{2}}{x - 2}$

3.  $\lim_{x \rightarrow 4} \frac{\sqrt{x^2 + 9} - 5}{x - 4}$

4.  $\lim_{x \rightarrow 2^-} \frac{|x - 2|}{x - 2}$

5.  $\lim_{x \rightarrow 0} \frac{\sin(3x)}{\sin(5x)}$

6.  $\lim_{x \rightarrow \infty} \frac{2 + x - 4x^3}{3x^3 - 4x^2 + 1}$

7. The limits  $\lim_{x \rightarrow 0^+} f(x)$  and  $\lim_{x \rightarrow 2^-} f(x)$ , given that  $x^2 \leq f(x) \leq 2x$  for  $x \in [0, 2]$ .

8. Suppose you know  $\lim_{x \rightarrow a} f(x) = 4$  and  $\lim_{x \rightarrow a} g(x) = -3$ . What can you say about

$$\lim_{x \rightarrow a} (f(x) + g(x)), \quad \lim_{x \rightarrow a} (f(x)g(x)), \quad \text{and} \quad \lim_{x \rightarrow a} \frac{f(x)}{g(x)}?$$

What if  $\lim_{x \rightarrow a} g(x)$  does not exist?