
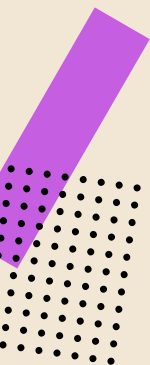


MATH 100: Differential Calculus Supplemental Learning

$$S_3 = \begin{bmatrix} 101 \\ 101 \\ 101 \\ 101 \end{bmatrix}$$

$$b^2 = c \cdot cb$$
$$a^2 = c \cdot ca$$

$$\pi = 3.141592$$
$$\alpha x = -\frac{\alpha x}{2x}$$




You can reach out to me at any time at rajveersodhi03@gmail.com, or leave me some feedback [here](#) ↗ (not for official use, this is just something I made to help me become a better SL Leader). Please note that you are free to walk in and out of my SL sessions at any time you please; you do not necessarily have to stay for the entirety of the sessions.





Exam Jam: Midterm Motivation – get ready for midterms and win a tablet!

Rajveer Sodhi (He/Him/His)

1 Section

Oct 3 at 1:05p.m.

Thursday, October 5th - 2:00 pm - 7:00 pm

*Exam Jam is here to help you get ready for midterms! From test writing tips, Chat GPT trivia, and yoga, to drop-in tutoring and Learning Strategist sessions, Exam Jam has something for everyone!! **Join 3 or more activities and be entered to win an Amazon Fire tablet!** To see the full schedule and more event details, [register now!](#) *

When: Thursday, October 5th from 2:00 pm - 7:00 pm

Where: The Student Learning Hub (LIB 237) & Hangar Fitness Centre (Studio 1). View the [Exam Jam Schedule](#) for specific event locations

How: Visit the Exam Jam check-in table (in the Student Learning Hub) to pick up your event passport. Get your passport stamped at 3 event activities and you can enter to win!

Questions? Contact learning.hub@ubc.ca

Thanks all!



Quiz 2!

Limits

Friday, September 22nd



**Continuity and
Limits at Infinity**

**Intermediate
Value Theorem**

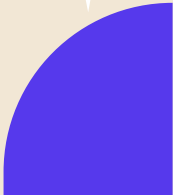

**Vertical
Asymptotes**



Tangent Lines

**Introduction
to Derivatives**

**Power and
Product Rules**



1. Find the following limits. If the limit does not exist, use ∞ or $-\infty$ when appropriate.

$$(a) \lim_{x \rightarrow 2^-} \frac{x - 4}{x^2 + x - 6}$$

$$(b) \lim_{x \rightarrow 4} \frac{3x - 2}{x^2 - 8x + 16}$$

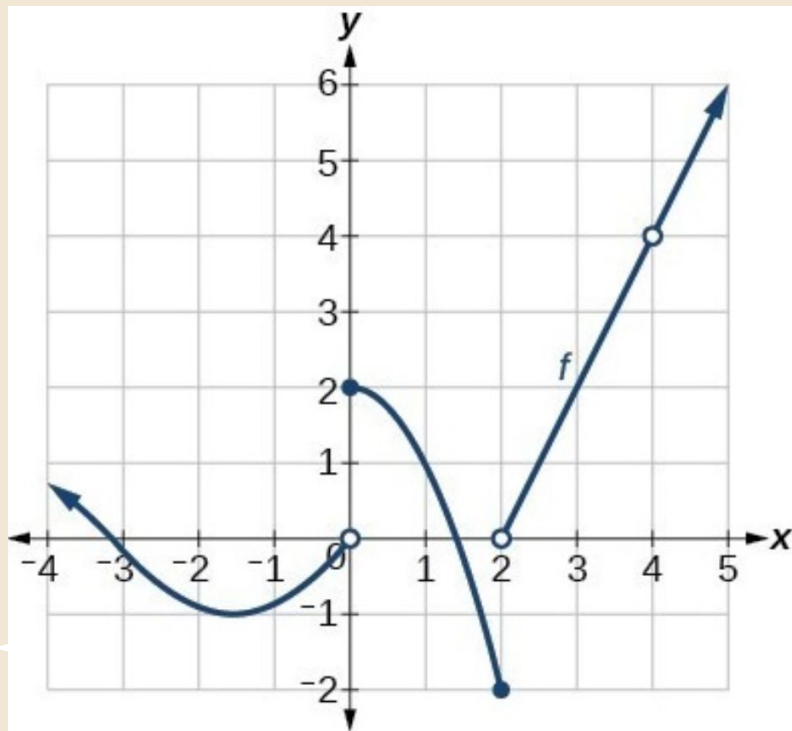
2. Find all vertical and horizontal asymptotes of the function.

$$g(x) = \frac{2x^2 + x - 1}{x^2 + 4x + 3}$$

3. Using only algebraic techniques, calculate

$$\lim_{x \rightarrow -\infty} \frac{3x^5 - 2x^4 + x^2 - 2x + 1}{2x^2 - x + 4}$$

4. Consider the piecewise function $f(x)$ in the graph below



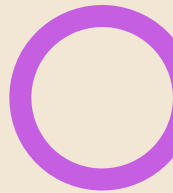
At what values of x is the function *not* continuous?

Explain your answer.




5. Where is the function $g(x) = \frac{\sqrt{3-x} + \sin(x)}{x+2}$ continuous?





6. Using the **limit definition** of a derivative, calculate $f'(2)$ for $f(x) = 2 - x^2$





Pick the largest set below on which the function $f(x) = \frac{-\sin(x)}{\sqrt{2^{-x}}}$ is continuous.



A. \mathbb{R}


B. $(0, \infty) \iff x > 0$

C. $(-\infty, 0) \iff x < 0$

D. $(-\infty, 0) \cup (0, \infty) \iff x \neq 0$

E. $f(x)$ is not continuous anywhere.







True or False. The function $f(x) = \begin{cases} \frac{\sin(x)}{x} & \text{if } x \neq 0 \\ 1 & \text{if } x = 0 \end{cases}$ is continuous at $x = 0$.

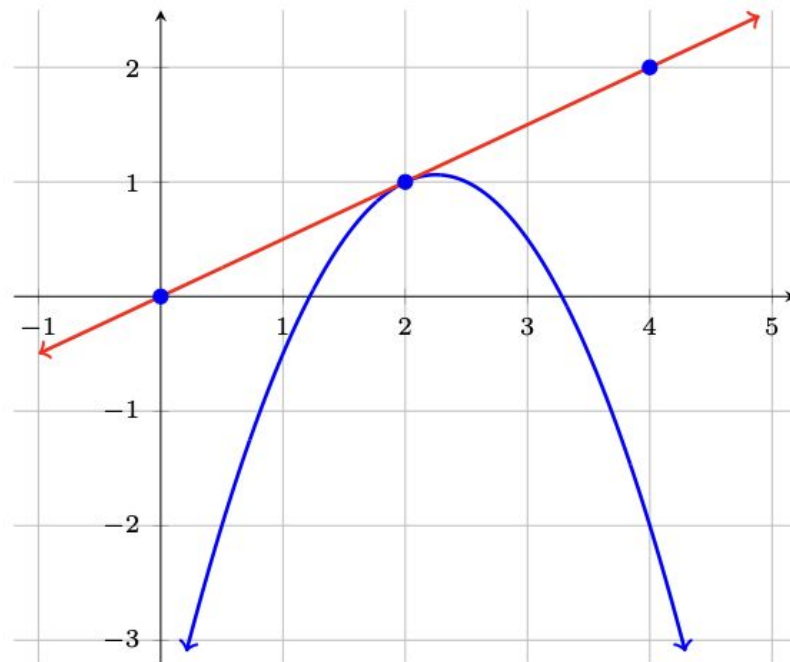
Note: $\lim_{x \rightarrow 0} \sin(x)/x = 1$

Proof:

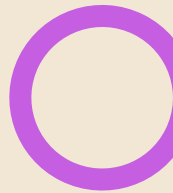
<https://www.khanacademy.org/math/ap-calculus-ab/ab-limits-new/ab-1-8/v/sinx-over-x-as-x-approaches-0>



Consider the function $f(x)$ below and its tangent line at $x = 2$.




What is the value of $f'(2)$?






Show that the equation $-\frac{8}{\pi^2}x^2 + \sin(x) = -6$ has at least one *positive* solution $x = c > 0$. Cite all relevant theorems.







Calculate the slope of the secant line to the function $f(x) = x^2 + 2x$ through the points $(1, 3)$ and $(-3, 3)$.



- 
10. You and your friend are honing your archery skills. It's your turn to get up and shoot the bow and arrow. The arrow travels in a straight line for ten seconds. Your friend calculates the distance function of the arrow after t seconds and determines it is given by,

$$d(t) = 260t + 20t^2 \text{ metres per second, } 0 \leq t \leq 10$$

- (a) Calculate the average velocity of the arrow between $t = 3$ and $t = 7$ seconds.
- (b) Calculate the instantaneous velocity of the arrow at $t = 3$ seconds. You must use a limit to do this. No shortcuts allowed.
- 
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Additional Exercises: CLP (as per profs)

§1.5 - Limits at Infinity. 3 - 26 odd.

§1.6 - Continuity. 3, 4, 5, 7, 8, 11, 13, 15, 17, 18, 21, 28 (tricky)

§2.2 - Definition of a Derivative. 5, 6, 7, 9, 10, 11, 12, 16, 24, 25.

§2.3 - Interpretations of the Derivative. 1, 3, 5.

§2.4 - Arithmetic of Derivatives. 1 - 3, 5 - 11, 13, 16



**Any
Questions????**

