

**Chapter 1 checkpoint!**

Hello and welcome to your first checkpoint! Here come five questions, one about each of the learning targets from Chapter 1. This is your scorecard:

Learning target:	DF1	DF2	DFa	DFb	AD2
Your confidence level before starting (0-5):					
Your confidence level after the quiz (0-5):					
The mark you earned on this attempt:	Success! Try again!	Success! Try again!	Success! Try again!	Success! Try again!	Success! Try again!

Before anything else, please do the following:

- Rank your confidence from 0-5 on each of the learning targets. 5 means “I could teach a whole class about this;” 0 means “I am genuinely not sure I have heard these words before.”
- Write your name on this page and on each of the other pages of the quiz.

Then do the quiz! Some reminders:

- Open notes, closed computer.
- If you need more room to write, use the back of the same learning target page, or ask me for some scratch paper.
- Read the questions carefully and make sure you’re answering each part.
- Show all your work and explain all your thinking!

When you are done:

- Rank your confidence from 0-5 on each of the learning targets. 5 means “I absolutely nailed that question for sure;” 0 means “oof, I definitely didn’t get that one.”
- Make double sure your name is on every page, including any scratch paper.
- Hand in your work, separated by learning target.

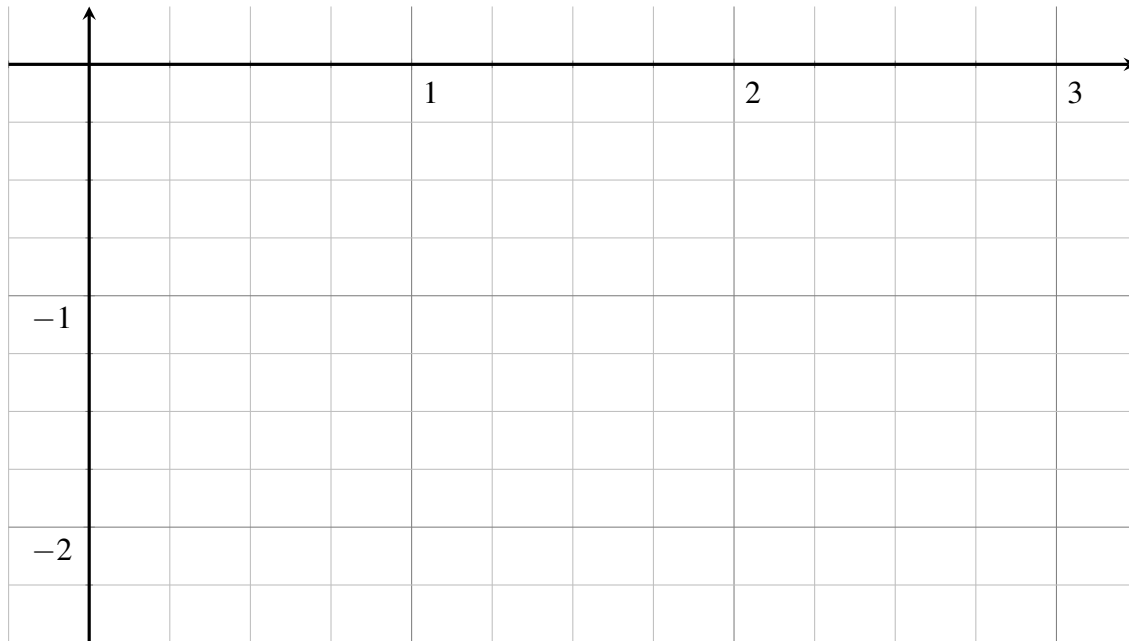
Have fun and do your best! I believe in u ♥

**Learning target DF1, version 1**

Suppose that you know the following values of some function  $g(x)$ :

$x$	1.7	2	2.3
$g(x)$	-2.2	-2	-1.5

1. Plot these points and sketch a plausible graph of  $g(x)$ .



2. On your graph above, draw a plausible tangent line to the graph of  $g(x)$  at  $x = 2$ .
3. Use a central difference to estimate  $g'(2)$ . Draw the corresponding secant line on your graph above.
4. Compute another estimate of  $g'(2)$ . Draw the corresponding secant line on your graph above.
5. Which one of your approximations is the best? How do you know?

**Learning target DF2, version 1**

Suppose that  $f(x) = 3x^2 - 5x + 4$ .

1. Use the limit definition of the derivative to find  $f'(x)$ . **No shortcut rules!**

2. Evaluate at  $x = 8$ .

3. (Bonus!) What happens to the 3? What about the  $-5$ ? And the 4?

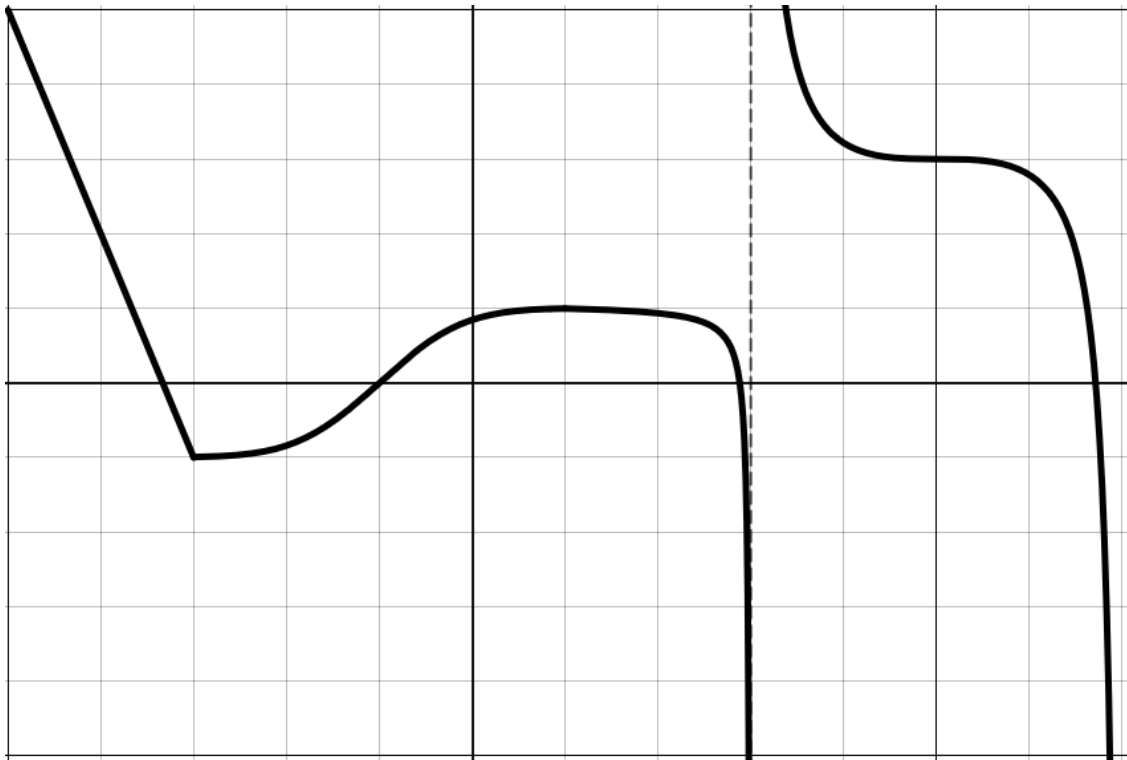
## Learning target DFa, version 1

A company manufactures rope, and the total cost of producing  $r$  feet of rope is  $C(r)$  dollars.

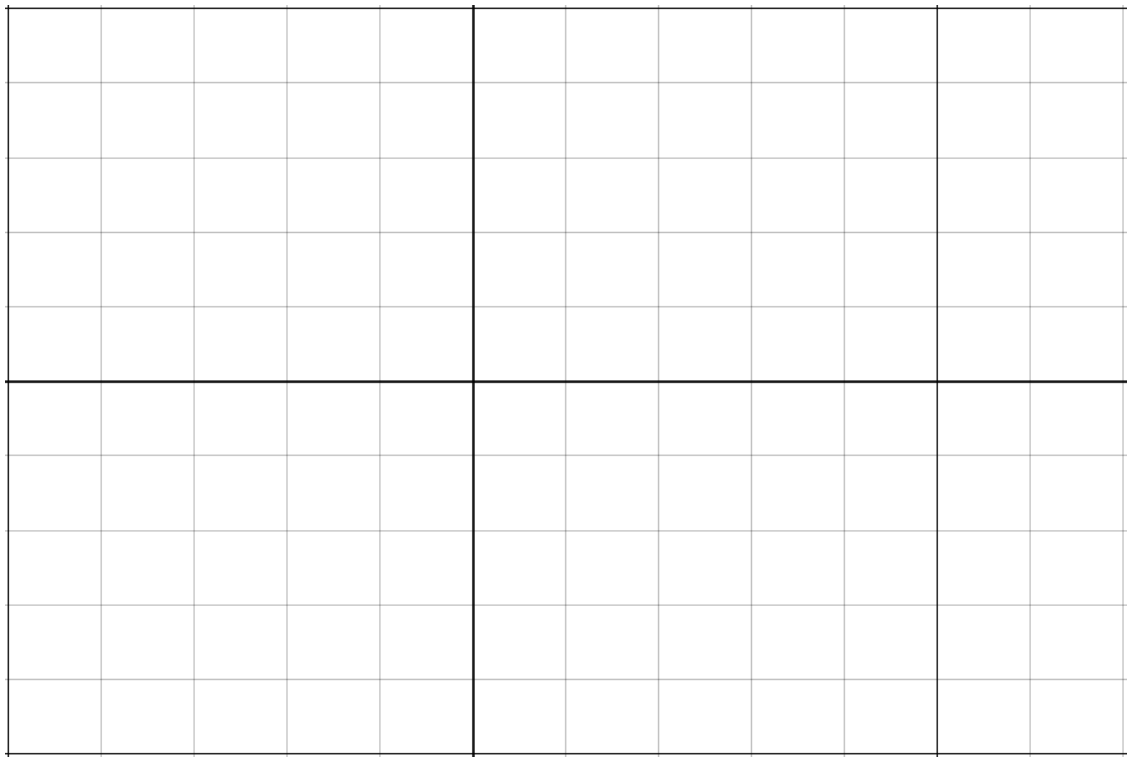
1. Suppose  $C(2000) = 800$ . Write a sentence explaining what this means, including units.
2. What are the units of  $C'(r)$ ?
3. Suppose  $C'(2000) = 0.35$ . Write a sentence explaining what this means, including units.
4. Do you think  $C'(3000)$  is greater than, equal to, or less than  $C'(2000)$ ? Explain why.

**Learning target DFb, version 1**

Here is the graph of some wacky function  $q(x)$ :



Sketch the graph of  $q'(x)$  on the blank axes below.



**Learning target AD2, version 1**

Suppose that for some function  $p(x)$ , you know the following information:

- $p(-2) = 5$ ,
- $p'(-2) = 1.5$ ,
- $p''(x) < 0$  for  $x$ -values close to  $-2$ .

1. Explain and demonstrate how to find the linearization  $L(x)$  of  $p(x)$  at  $x = -2$ .
2. Explain and demonstrate how to estimate the value of  $p(-2.03)$  using this linearization.
3. Is your estimate of  $p(-2.03)$  greater than or less than the actual value? How do you know?
4. Sketch a possible graph of  $p(x)$  and its linearization  $L(x)$  nearby  $x = -2$  to illustrate your findings. Label important points in your sketch with their coordinates.