

Revising D3- Curve Sketching

D3: I can use information about f , f' , and/or f'' to identify and/or draw accurate graphs of the other functions.

Basic Preparation

1. Did you do the written practice?
2. Did you do the WeBWorK?
3. Go back to your notes, any handouts from class, the desmos activities, WeBWorK and any written practice you were able to use to prepare. Compare this to your quiz/homework.
4. Do you understand what your mistake was? If so, briefly describe what the mistake is below. If you are unsure, please go to the Calculus Center and work with a tutor until you can describe what your mistake was.

Metacognition

Now, *WHY* did you make the mistake? Answering this question is asking you to think about *HOW* you think about math (metacognition). Spending time here will help you become more efficient at learning math and is therefore worth the time!

1. Was your incorrect answer due to
 - (a) not understanding a concept;
 - (b) an error in logical reasoning (e.g., used the correct theorem/test but made the wrong conclusion, used a theorem/test/technique when it did not apply);
 - (c) being careless (e.g. not reading directions, not answering the question completely, making arithmetic or basic algebra errors);
 - (d) not knowing how to start or formulate an approach to the problem;
 - (e) others?

Briefly describe why your answer was incorrect:

Where topic was first introduced: Modules 4 and 5

Video showing what f' can tell us about f : <https://youtu.be/IpxR9qFeA0s>

Favorite Mistakes:

- First translate all the information about the derivatives into words like concave up or increasing, then double check that your graph is demonstrating the requested behavior.
- Double check your interval notation: (a, b) means the endpoints are not included, $[a, b]$ means the endpoints are included.
- Double check that your function passes the vertical line test. Also check if there is a requirement that the function is continuous.
- If $f'(x) > 0$ then f' is NOT 0... so there cannot be any horizontal tangent lines where $f' > 0$
- If $f'(-3) = 0$ or DNE, then you can't say that $f' < 0$ on an interval containing $x = -3$. But you could say $f' < 0$ on $(-\infty, -3)$ and $(-3, 0)$.

Example:

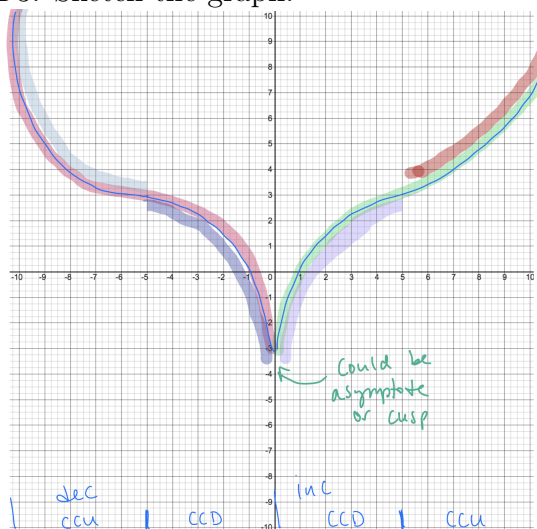
Sketch the graph of a **function**, $f(x)$, that has the following properties.

- $f'(x) < 0$ for $x < 0$ $f' < 0$ means f decreasing
- $f'(x) > 0$ for $x > 0$ increasing
- $f''(x) > 0$ for $x < -5$ $f'' > 0$ means F CCU
- $f''(x) < 0$ for $-5 < x < 0$ CCD
- $f''(x) < 0$ for $0 < x < 5$ CCD
- $f''(x) > 0$ for $x > 5$ CCU

D4 List the intervals where $f(x)$ is:

- increasing
See the second bullet point above: $x > 0$
- decreasing
See the first bullet point above: $x < 0$
- concave up
All the places $f'' > 0$: $x < -5$ and $x > 5$
- concave down
 $-5 < x < 0$ and $0 < x < 5$

D3: Sketch the graph.



Prepare for revision:

First, reflect on your mistake and the correct solution and what you learned: fill in the blanks “I used to think _____but now I think _____because I learned _____.”

1. Sketch the graph of a function so that all the following characteristics are true:

- $f''(-8) < 0$
- $f'(0) < 0$
- $f'(3) = 0$
- $f'(5) > 0$
- $f''(8) > 0$

2. Sketch the graph of a function so that all the following characteristics are true:

- $g''(-8) > 0$
- $g'(-3) < 0$
- $g'(0) = 0$
- $g''(3) < 0$
- $g'(8) > 0$

3. Sketch the graph of a function such that:

- | | |
|-----------------|----------------|
| • $f'(-8) > 0$ | • $f''(3) = 0$ |
| • $f''(-5) < 0$ | • $f'(4) < 0$ |
| • $f'(-5) = 0$ | • $f''(6) > 0$ |
| • $f'(-2)$ DNE | • $f'(7) > 0$ |
| • $f''(0) < 0$ | |