Today

- Midterm discussion
- Inflection points
- Putting it all together - using f, f′ and f″ to sketch a graph.

Today, I'd like to ...

(A) ...talk about the midterm.

(B) ...talk about the BIOL 112 midterm.

(C) ...go for coffee.

(D) ...learn more math so I can ace Midterm 2.

I thought the midterm was...

(A) ...easier than I expected.

(B) ...pretty much what I expected.

(C) ...harder than I expected.

The hardest part of the midterm was...

(A) ...the multiple choice section.

(B) ...the short answer section.

(C) ...long-answer #1 (tangent line || to y=-x).

(D) ...long-answer #2 (Find a,b so f′ exists).

(E) ...long-answer #3 (All-you-can-eat).

The most useful thing I did to study was...

(A) ...doing/reviewing WeBWorK assignments.

(B) ...doing/reviewing OSH.

(C) ...doing practice problems from the course notes.

(D) ...reading the course notes.

(E) ...reviewing the lecture slides.

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- If $f''(x)$ changes sign at a potential IP of $f(x)$, then it is an IP of $f(x)$ because it's an extrema of $f'(x)$.
- If $f''(x)$ does not change sign at a potential IP of $f(x)$, then the potential IP is not an IP of $f(x)$!

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- Solve f′(x)=0 to find potential extrema (x=a). Check that f′(x) changes sign at a (FDT) or that f″(a) <> 0 (SDT) to make sure.

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- Use $f'(x)$ to determine intervals of increase/decrease of $f(x)$.
- Solve $f'(x)=0$ to find potential extrema ($x=a$). Check that $f'(x)$ changes sign at a (FDT) or that $f''(a) <> 0$ (SDT) to make sure.
- Use $f''(x)$ to determine intervals of concave up/down.

Summary

- Use $f'(x)$ to determine intervals of increase/decrease of $f(x)$.

- Solve $f'(x)=0$ to find potential extrema $(x=a)$. Check that $f'(x)$ changes sign at a (FDT) or that $f''(a) <> 0$ (SDT) to make sure.

- Use $f''(x)$ to determine intervals of concave up/down.

- Solve $f''(x)=0$ to find potential inflection points $(x=a)$. Check that $f''(x)$ changes sign at a ("FDT" or that $f'''(a) <> 0$ ("SDT") to make sure.

Does $f(x) = x^4$ have an inflection point?

(A) $f'(0) = 0$ so yes.

(B) $f''(0) = 0$ so yes.

(C) $f'''(0) = 0$ so no.

(D) $f''(0) = 0$ and $f''(x) > 0$ for all $x \neq 0$ so no.

(E) Don't know.

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Not sure about (C)? Try this for $f(x)=x^5$.

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$f''(x) = 12x^2$

(E) Don't know.

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