Sketching functions using calculus tools

Math 102 Section 102
Mingfeng Qiu

Oct. 5, 2018

Annoucements

- Next Monday: NO CLASS!
- Thank you for coming to class on time
- Thank you for answering questions in class
- Thank yourself for finishing homework on time, coming to office hours, going to Piazza, doing exercises in slides, reading your textbook, watching the videos, practicing the spreadsheet...

Last time

- Concavity and the second derivative
- Exercise in using calculus tools to identify shapes of functions

Example

Sketch the function

$$f(x) = \frac{1}{4}x^4 - 2x^3 + \frac{9}{2}x^2 + 1$$

(See doc cam scan for sketch)

Example

Sketch the function
$$f(x) = \frac{(x-1)^2}{x^3}$$

(See doc cam scan for sketch)

- Definition of monotonicity
  - If f' exists, it can be used to identify monotonicity.
- Definition of critical points and local extrema
  - If f' exists, FDT may identify local extrema, from the change of sign of f'. (sufficient but not necessary condition)
  - If f'' exists, SDT may identify local extrema, from the sign of f''. (sufficient but not necessary condition)
- Definition of concavity and inflection points
  - If f'' exists, its sign tells the concavity.