Today

- Reminders:
  - OSH 3 on Monday, Assign. 4a on Tues 7am,
  - Midterm 1 on Tues 6pm.
    - S.101 - HENN 200,
    - S.103 - Last name A-K: BUCH A203
    - S.103 - Last name L-Z: BUCH A103

Today

- How to choose x_0 for Newton's method.
- Inc/dec, critical points and extrema.
- First and Second derivative test.
- Concavity, potential IPs and actual IPs.

How to choose x_0

Desmos:

- https://www.desmos.com/calculator/hf5ll3di1l

Increasing/decreasing

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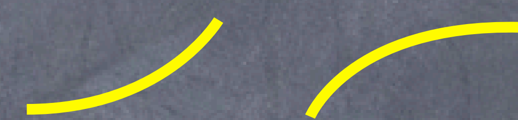
- We say a function is **increasing** on some interval if for any points a and b with **$a < b$** we have that **$f(a) < f(b)$**.



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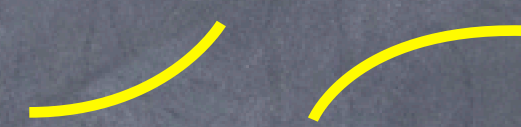

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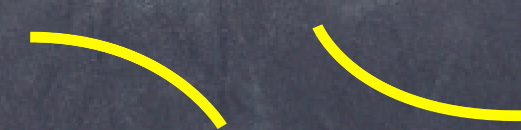

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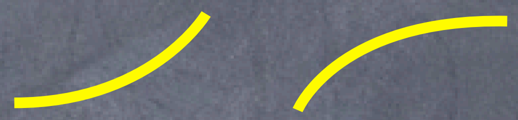

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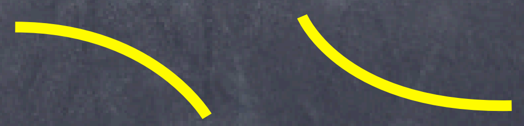

- Notice - no reference to $f'(x)$!!

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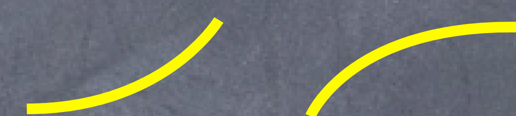

When f′ exists, same as $f'(x)>0$.

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Sunday, September 28, 2014

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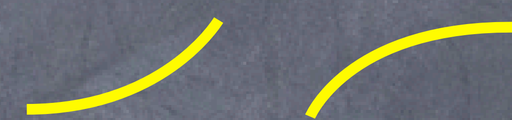

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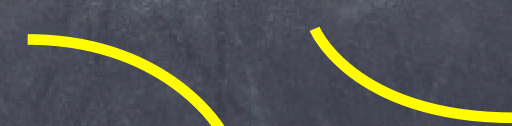

When f′ exists, same as $f'(x)<0$.

- Notice - no reference to $f'(x)$!!

Local extrema (min/max)

- A point **a** is a **local minimum** of a function f(x) provided that **$f(x) > f(a)$** for all x on an interval around a (excluding a, of course).
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(A)  (B)  (C) 

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  - If the function is differentiable at the minimum, then it must look like (A).

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  - If f'(x) does not change sign at a CP, then the CP is not an extremum of f(x)!

Critical points - examples

Desmos

- https://www.desmos.com/calculator/nyquvpptn5

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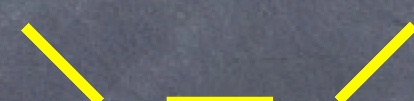

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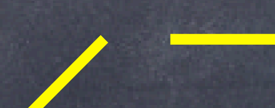

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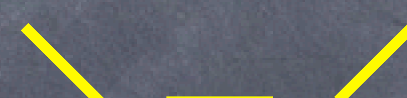

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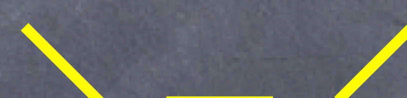

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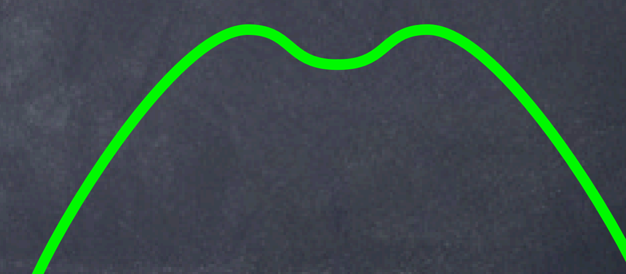

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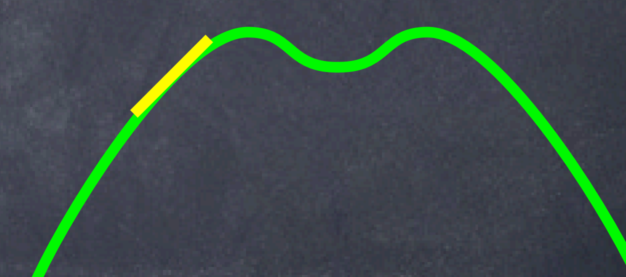

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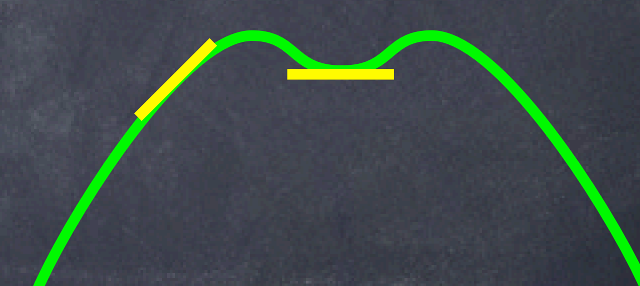

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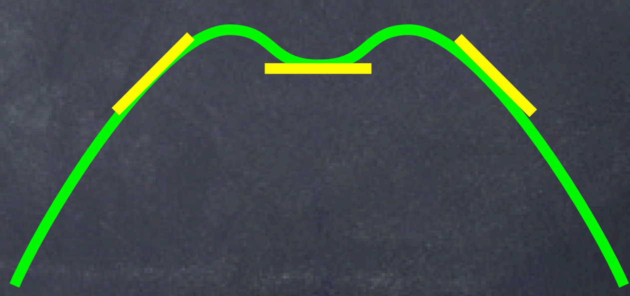

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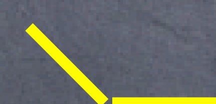

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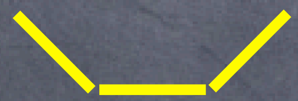

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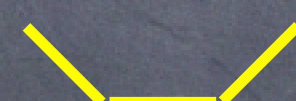

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    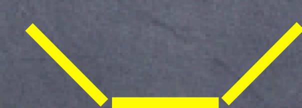
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    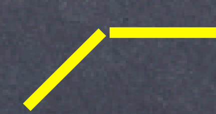

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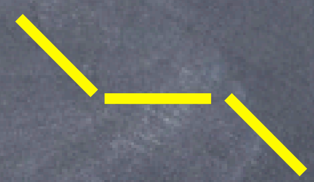

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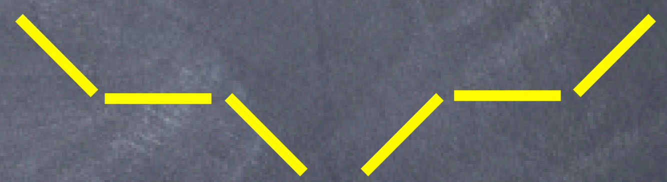

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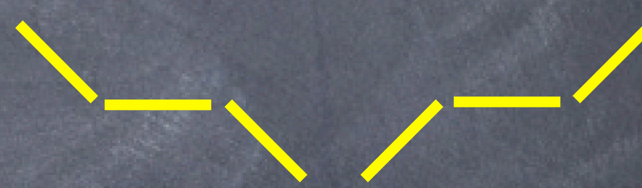

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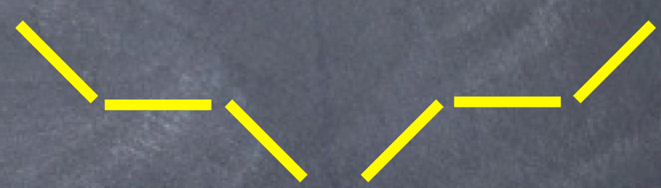

- Ex.: $f(x) = x^3$ --> $f'(x)=3x^2$

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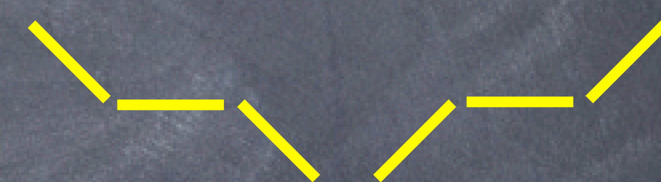

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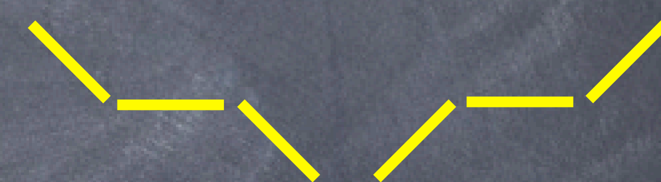

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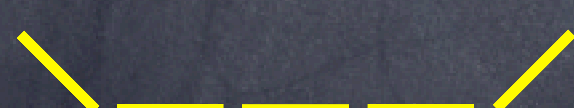

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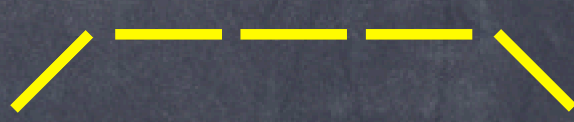

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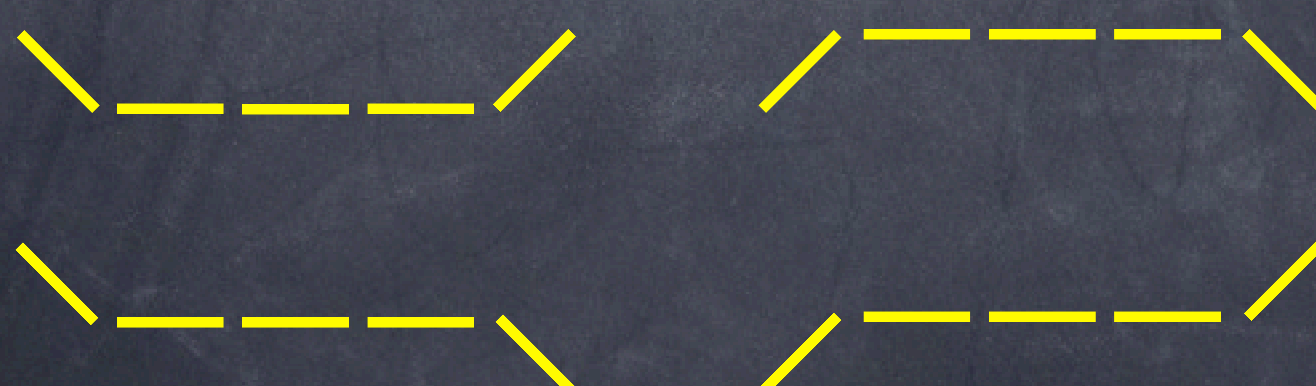

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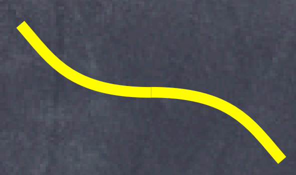

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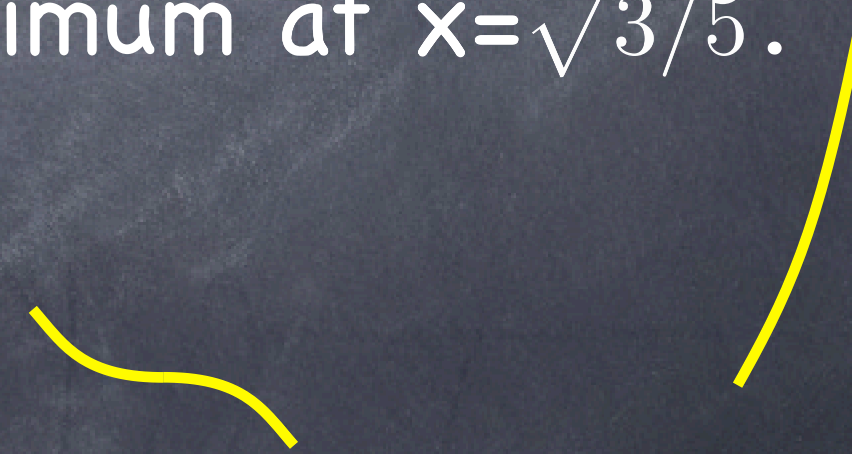

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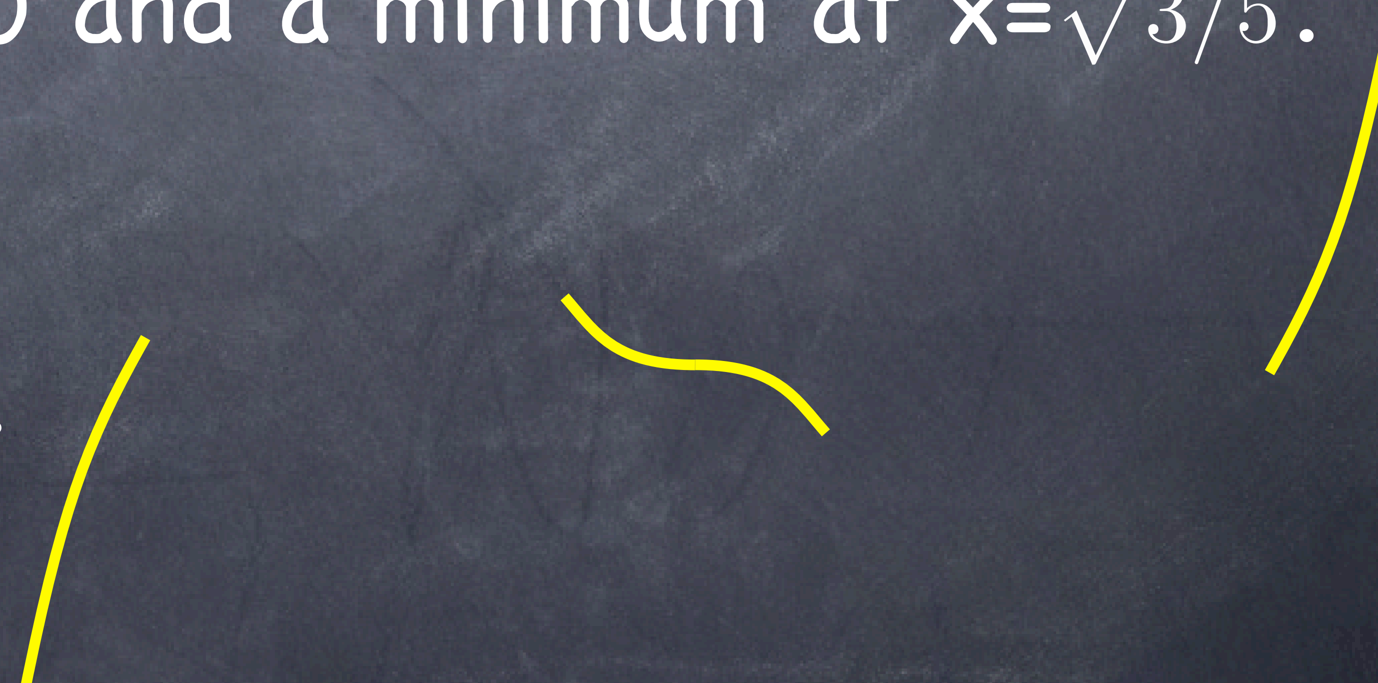

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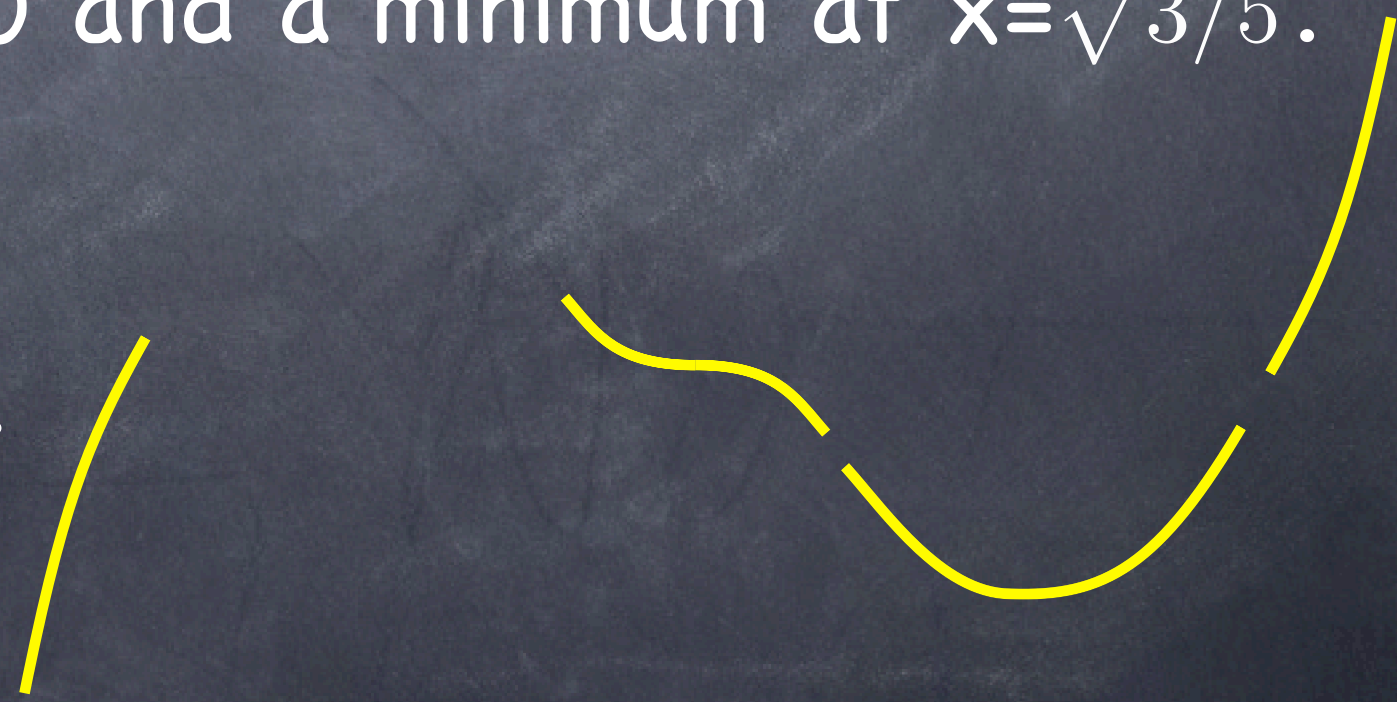

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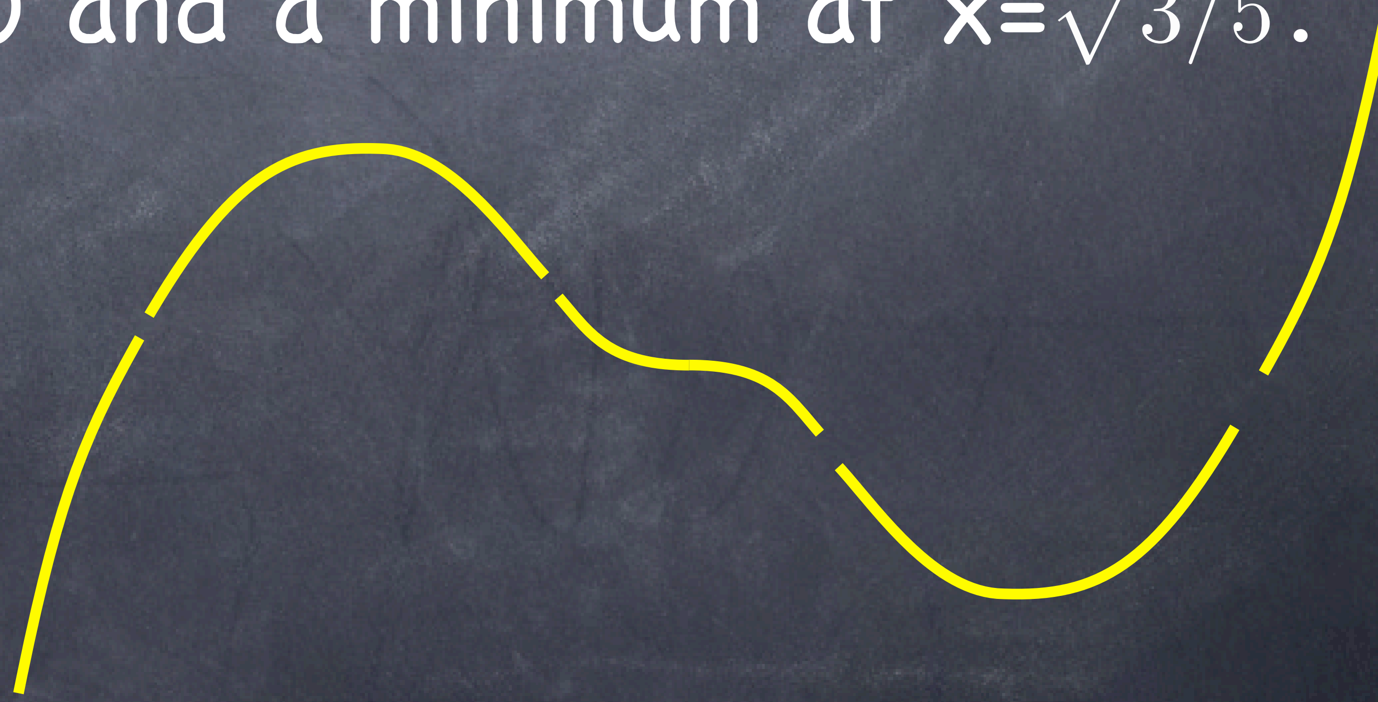

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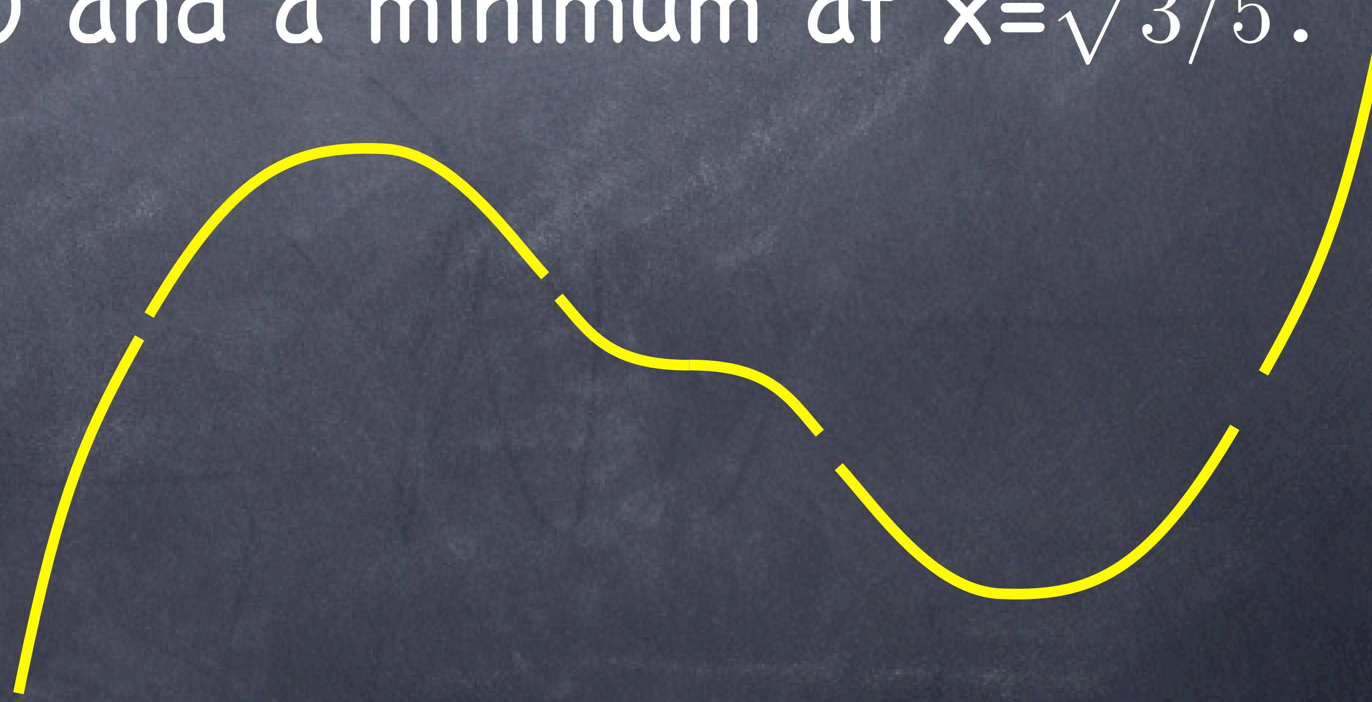

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(i) FDT: $g'(x) \approx -3x^2$ near $x=0$ so $g'(x)$ doesn't change sign!

(ii) SDT: $g''(x) = 20x^3 - 6x = 2x(10x^2 - 3)$ so $g''(0)=0$ --> mystery!

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better!!

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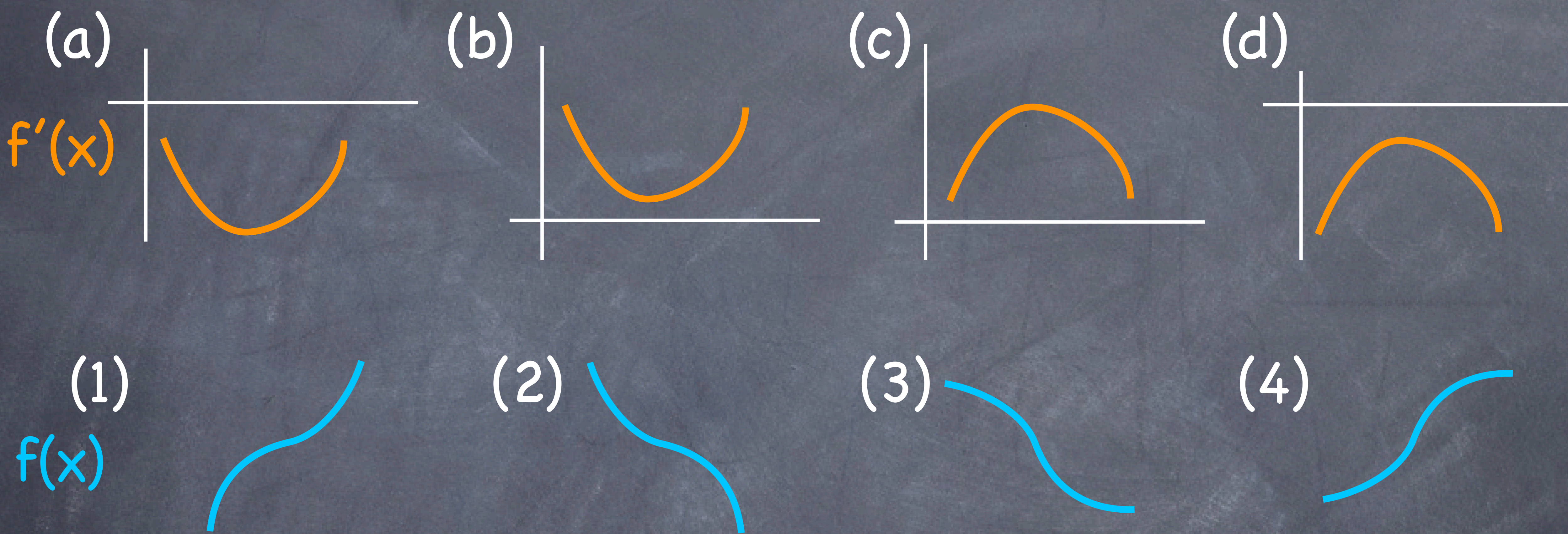
Match f′(x) to f(x)



(A) 1d, 2b, 3a, 4c

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(C) 1b, 2d, 3c, 4a

(D) 1c, 2a, 3d, 4b

(E) Don't know.

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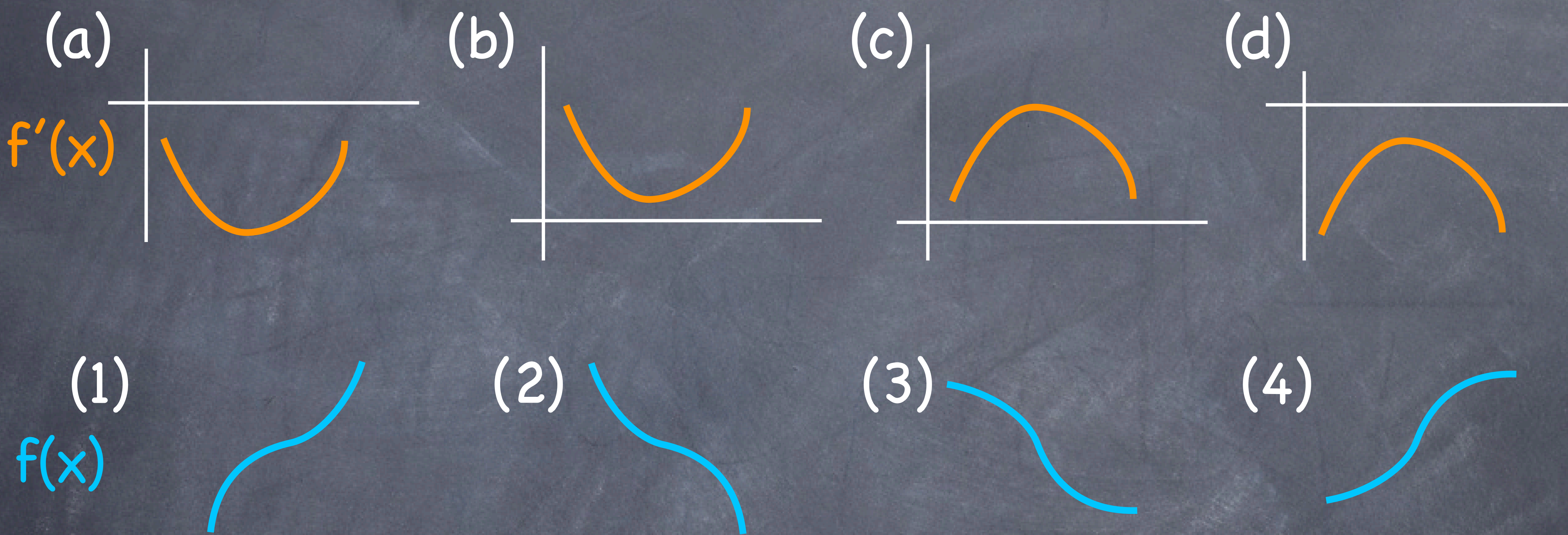

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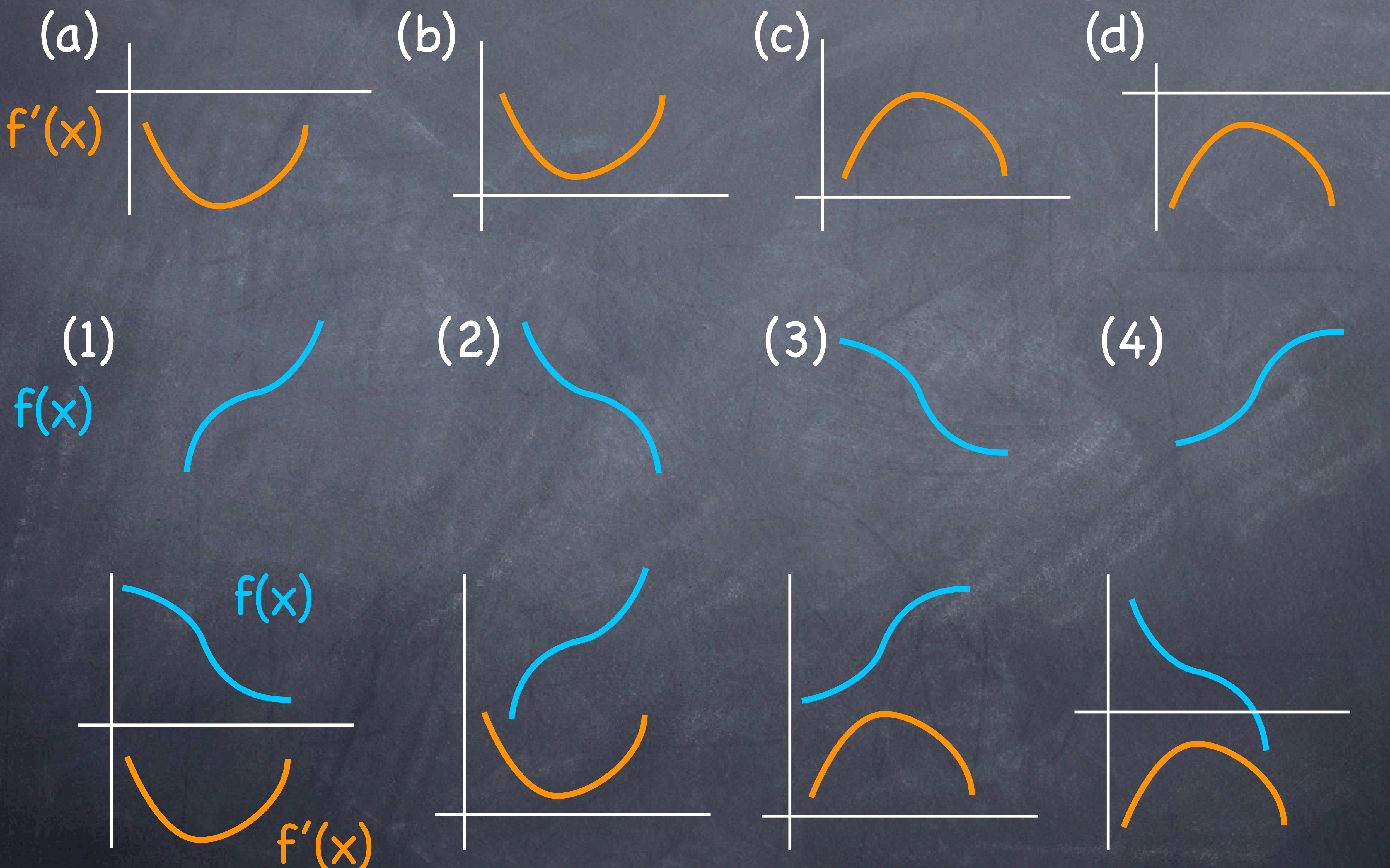

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This is "SDT" where the function considered is f' instead of f! Would usually use "FDT".