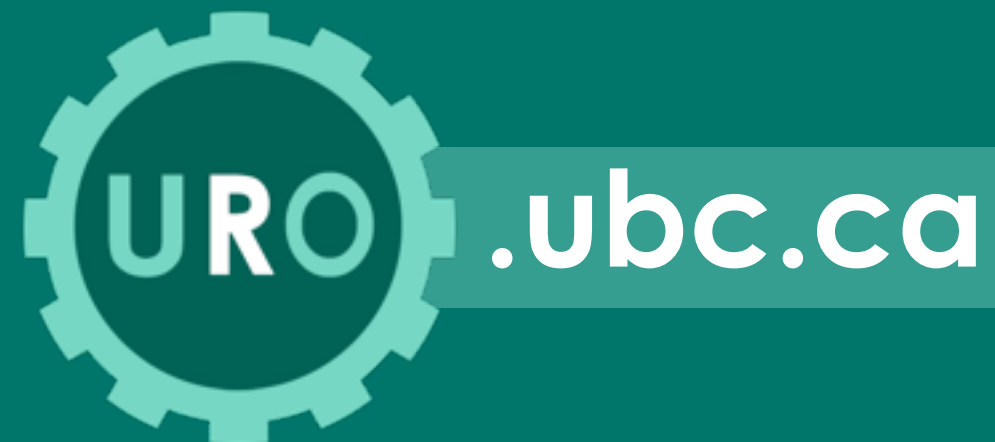


Today

- Announcement: Undergraduate research opportunity.
- Some clicker questions about differentiability.
- Geometric perspective on tangent lines and the derivative.
- Sketching the graph of $f'(x)$ given the graph of $f(x)$.
- Reminders:
 - Wed - PL3.2,
 - Thurs - Assignment 2,
 - Fri - PL3.3,
 - In two weeks - OSH 3.
 - In two weeks + 1 day - Midterm 1!

Interested in RESEARCH? Deadline Sept. 30

Join the REX Program with
Undergraduate
RESEARCH
Opportunities



Continuity and differentiability

- A function that is continuous at a point must also be differentiable at that point?
 - (A) True. (B) False. (E) Not sure.

is continuous

has a derivative

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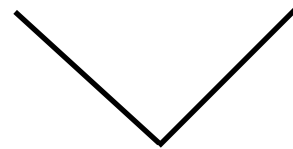
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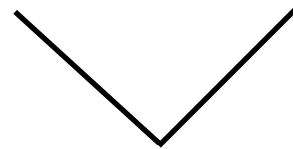
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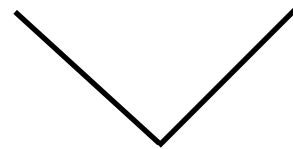
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- A function that is differentiable at a point must also be continuous at that point?

- (A) True. (B) False.

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- If a function is differentiable, then it looks like a straight line near the point and straight lines are continuous.

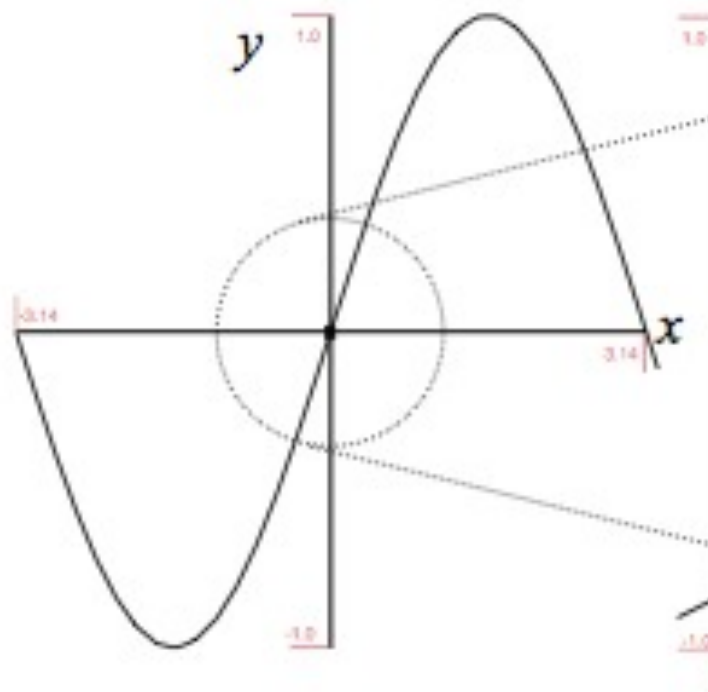
The tangent line and the derivative

The tangent line and the derivative

- The tangent line at a point is the **UNIQUE** line that looks like the function when you zoom in on that point.

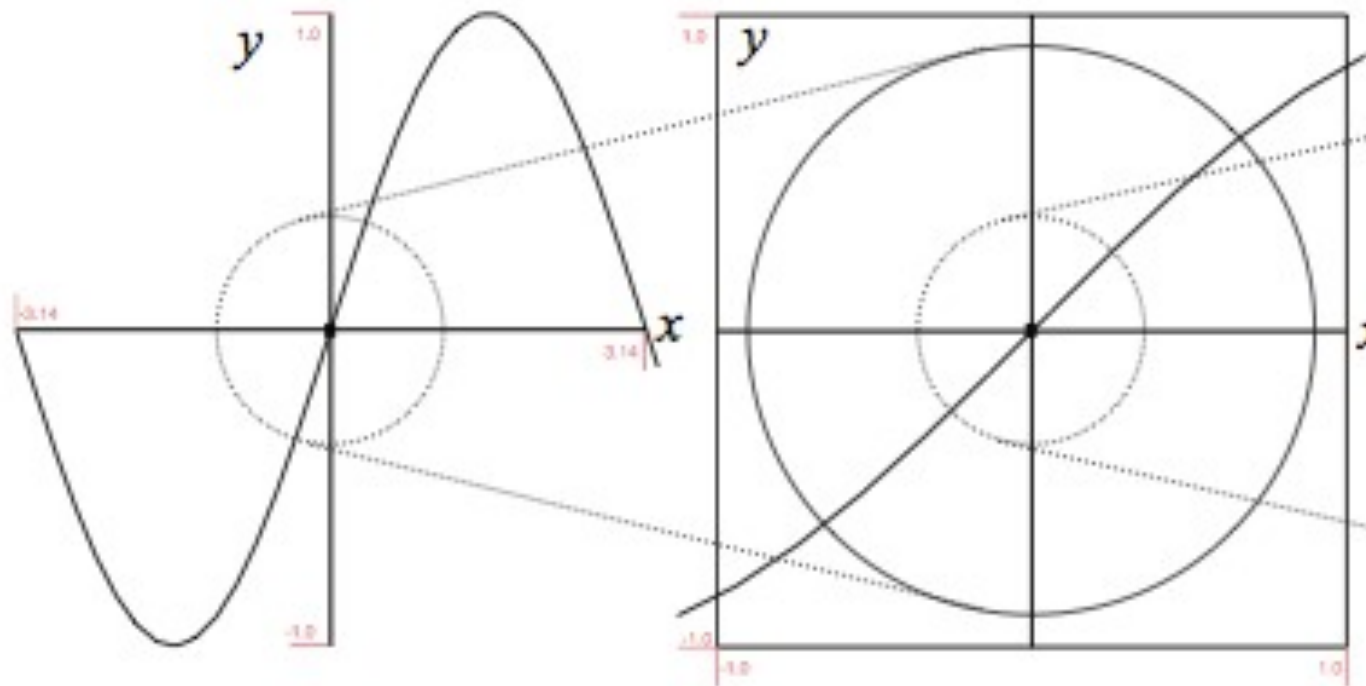
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- The tangent line at a point is the **UNIQUE** line that looks like the function when you zoom in on that point.
- $\sin(x)$ - zoom in on $x=0$.



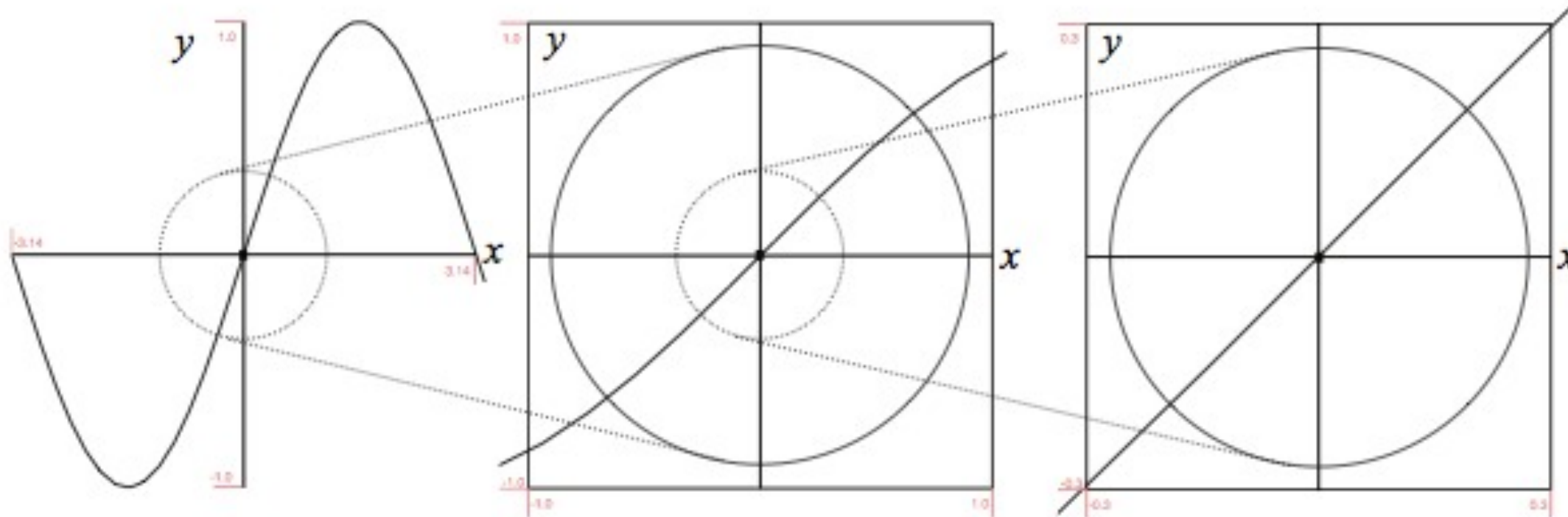
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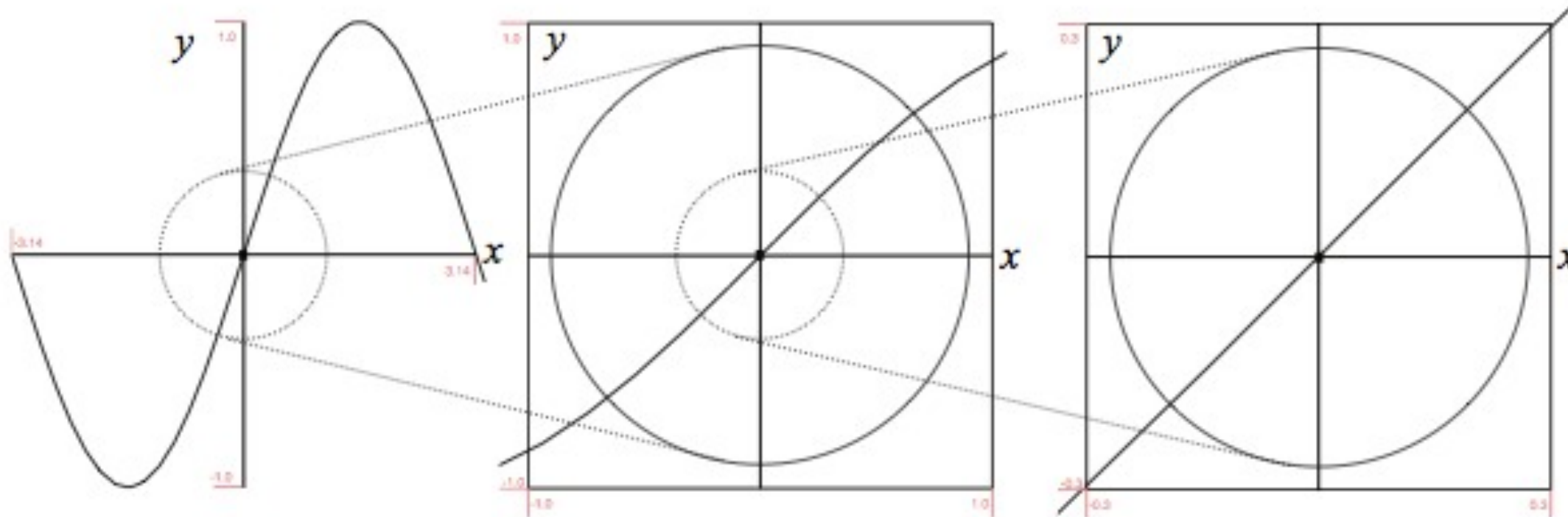
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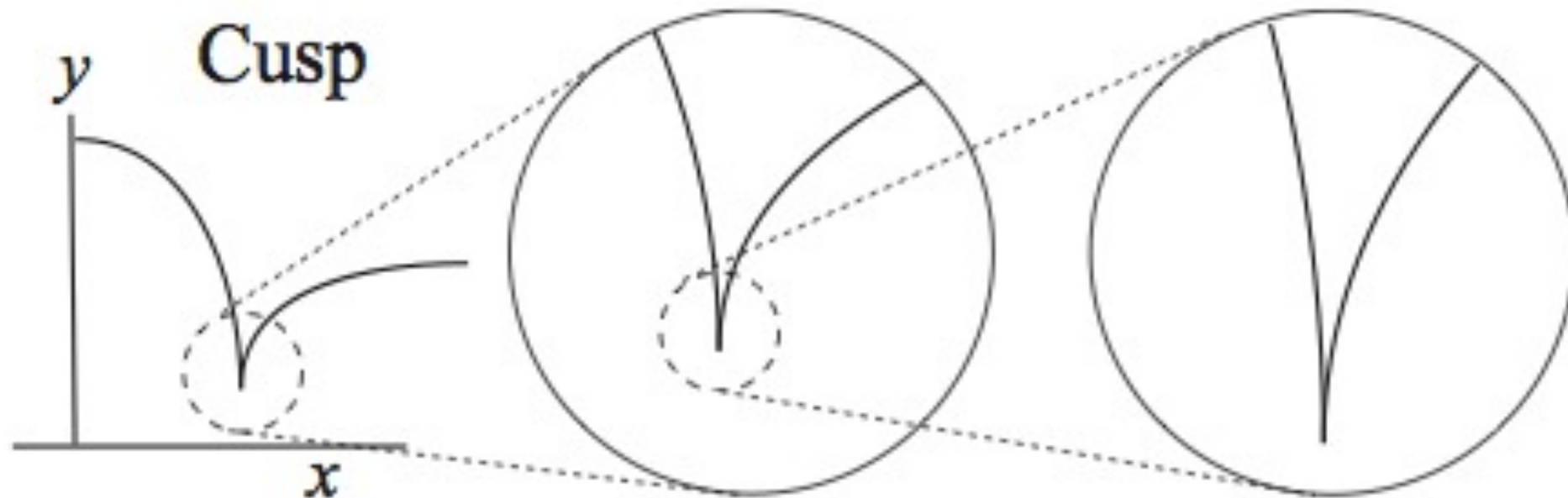
The tangent line and the derivative

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- $\sin(x)$ - zoom in on $x=0$.
- Tangent line is $y=x$.

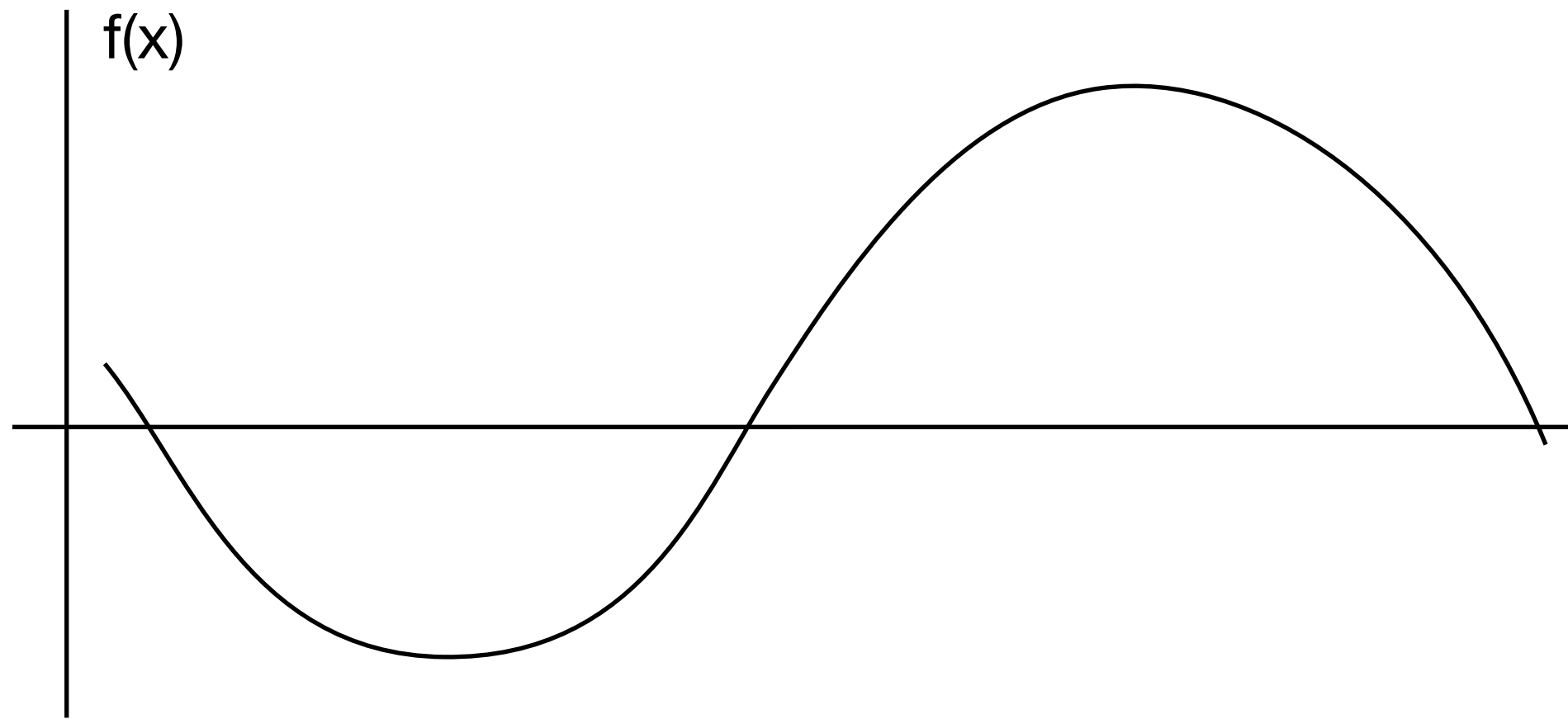


The tangent line and the derivative

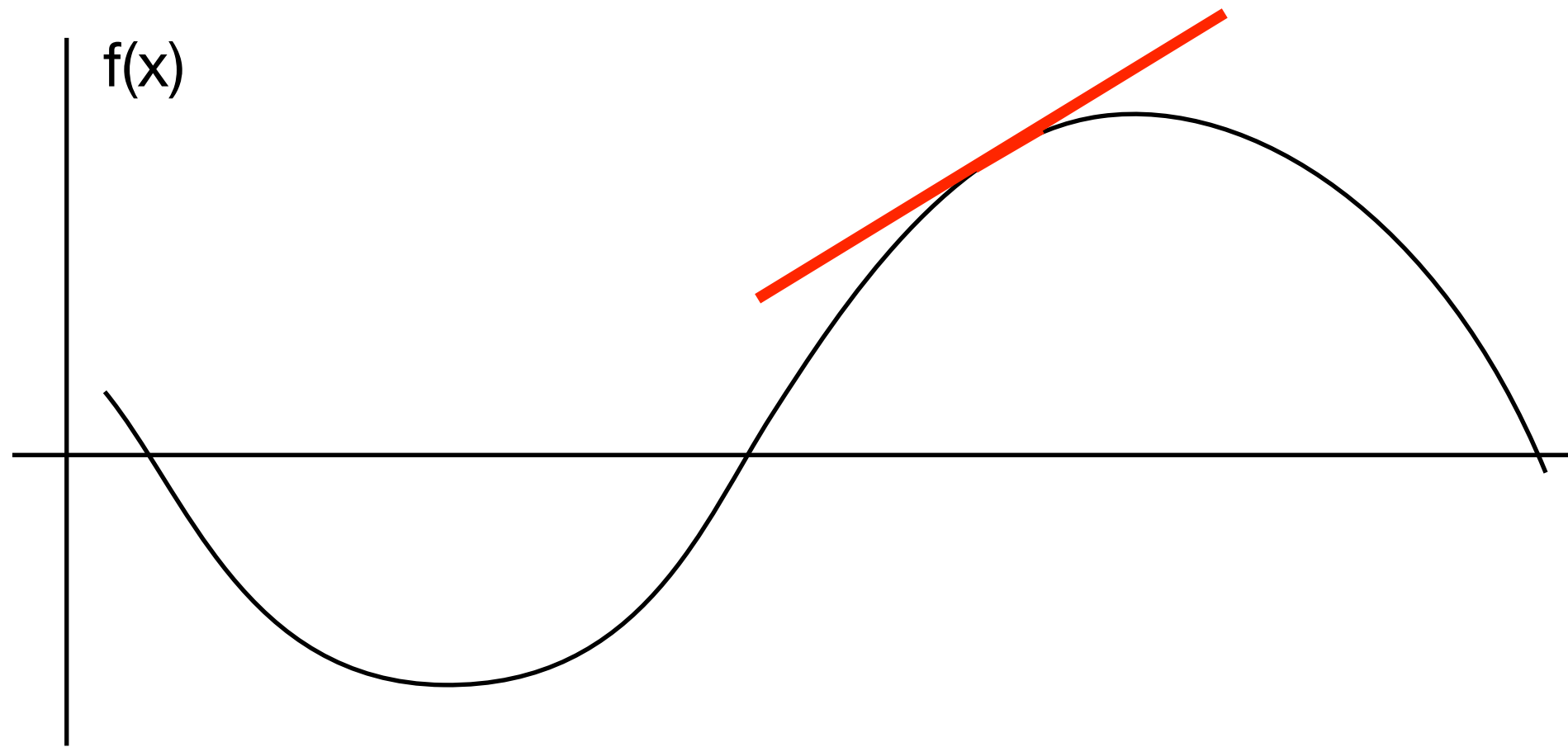
- The tangent line at a point is the **UNIQUE** line that looks like the function when you zoom in on that point.
- A tangent line doesn't always exist.



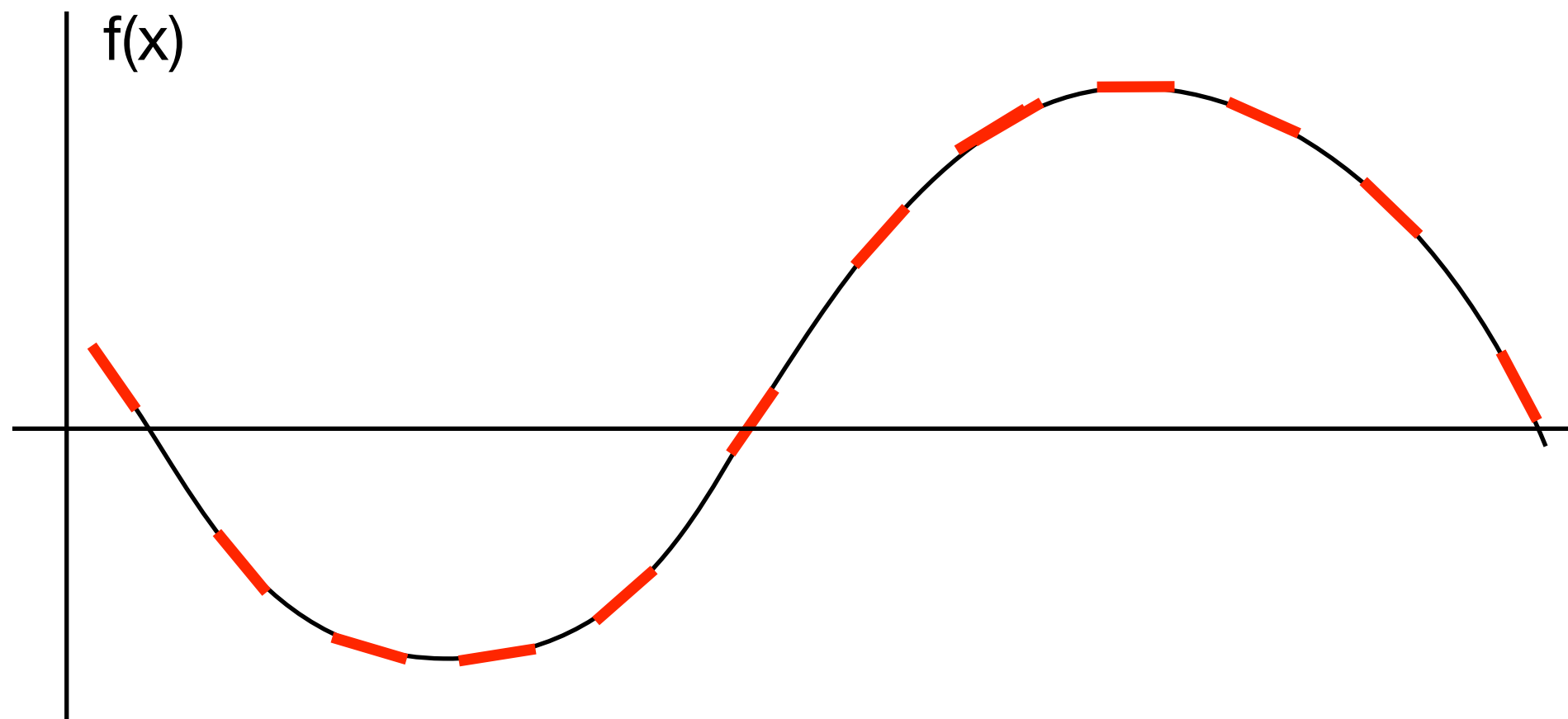
How to go from a graph of $f(x)$ to a graph of $f'(x)$



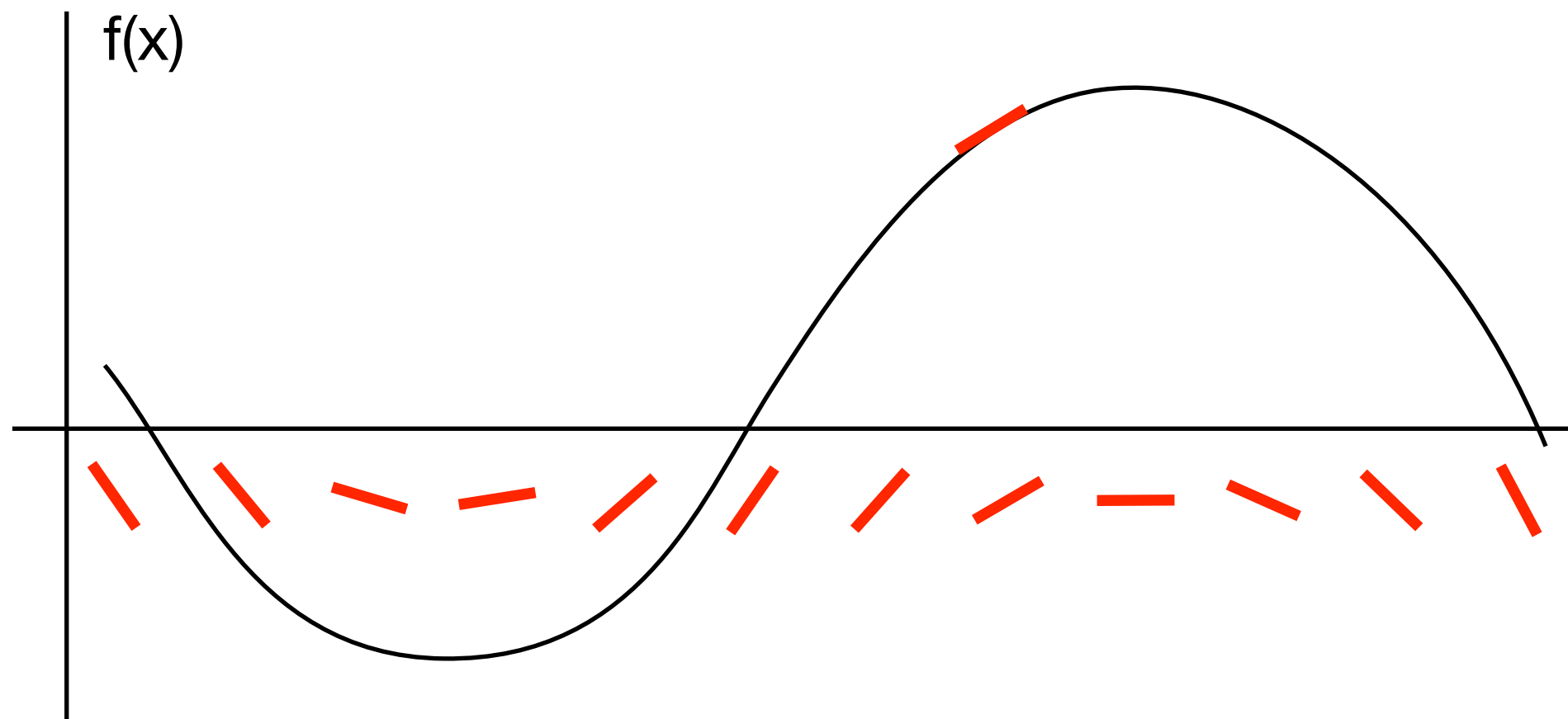
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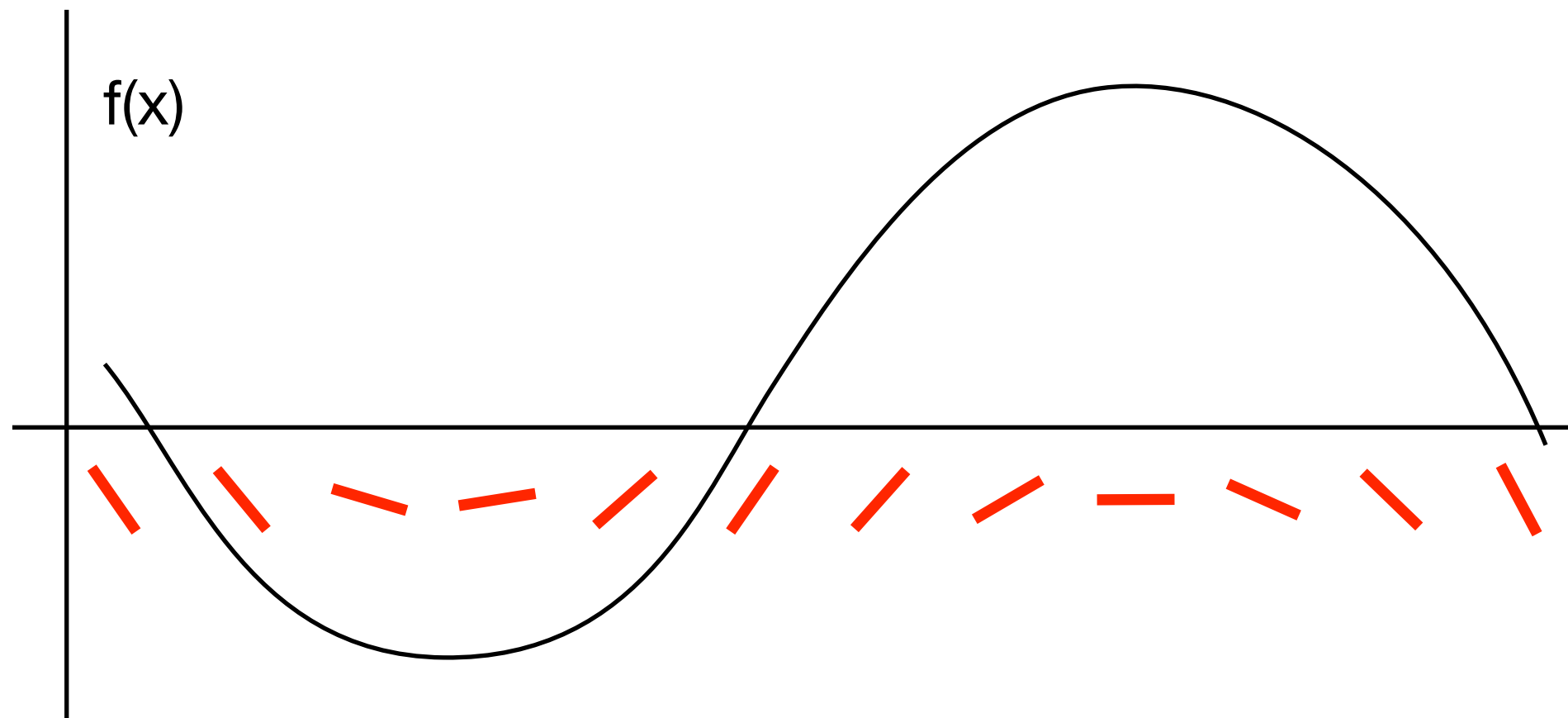
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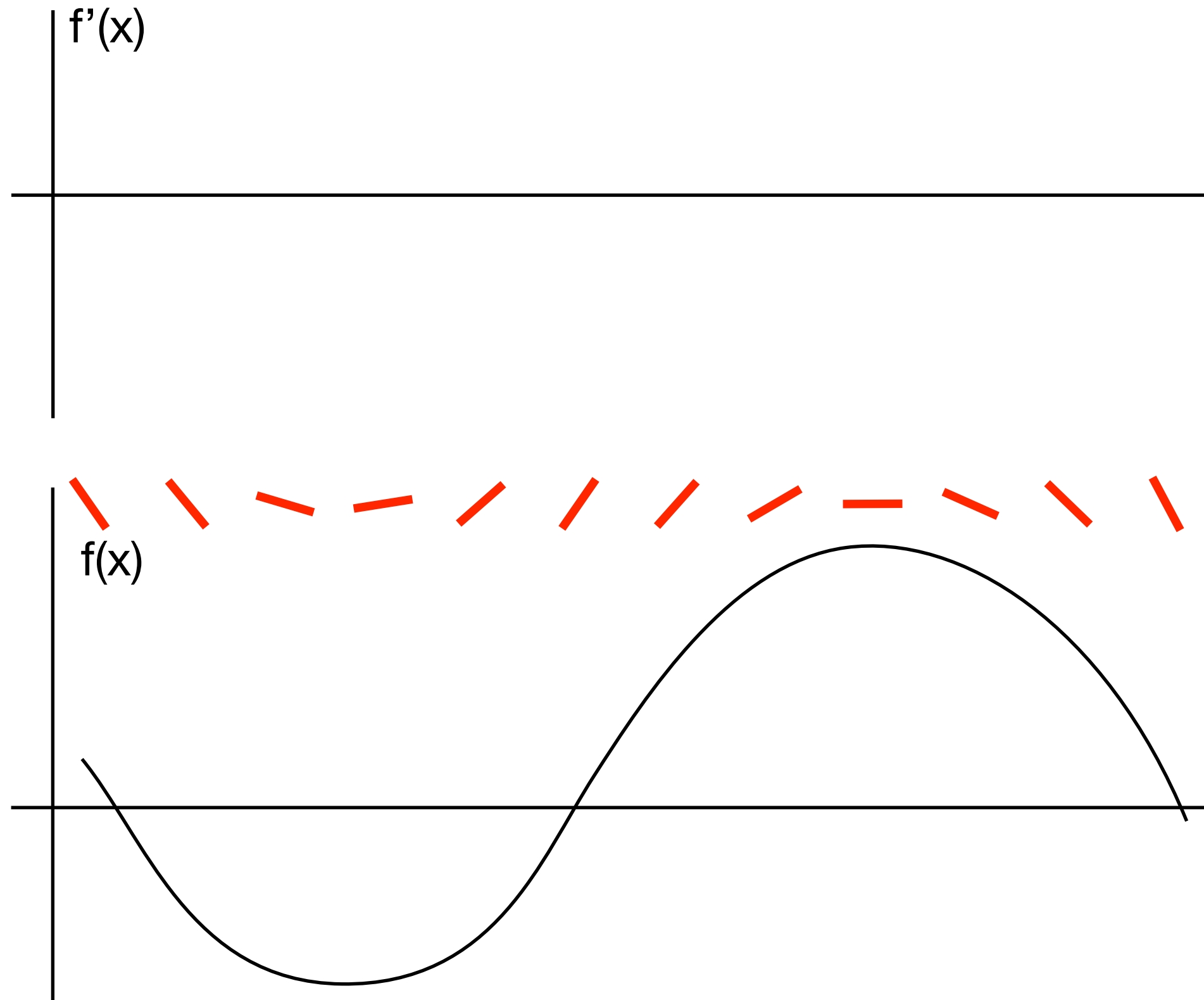
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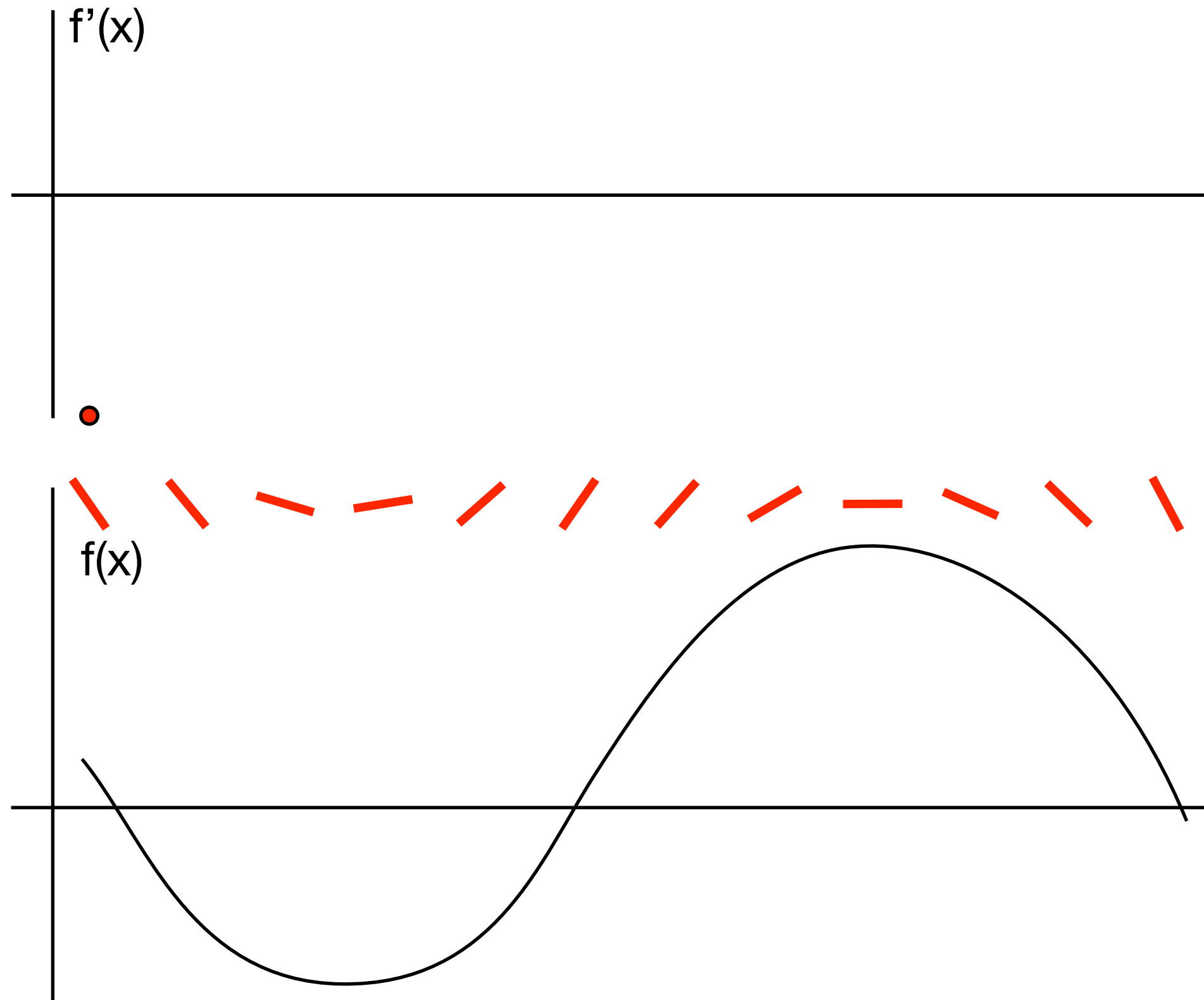
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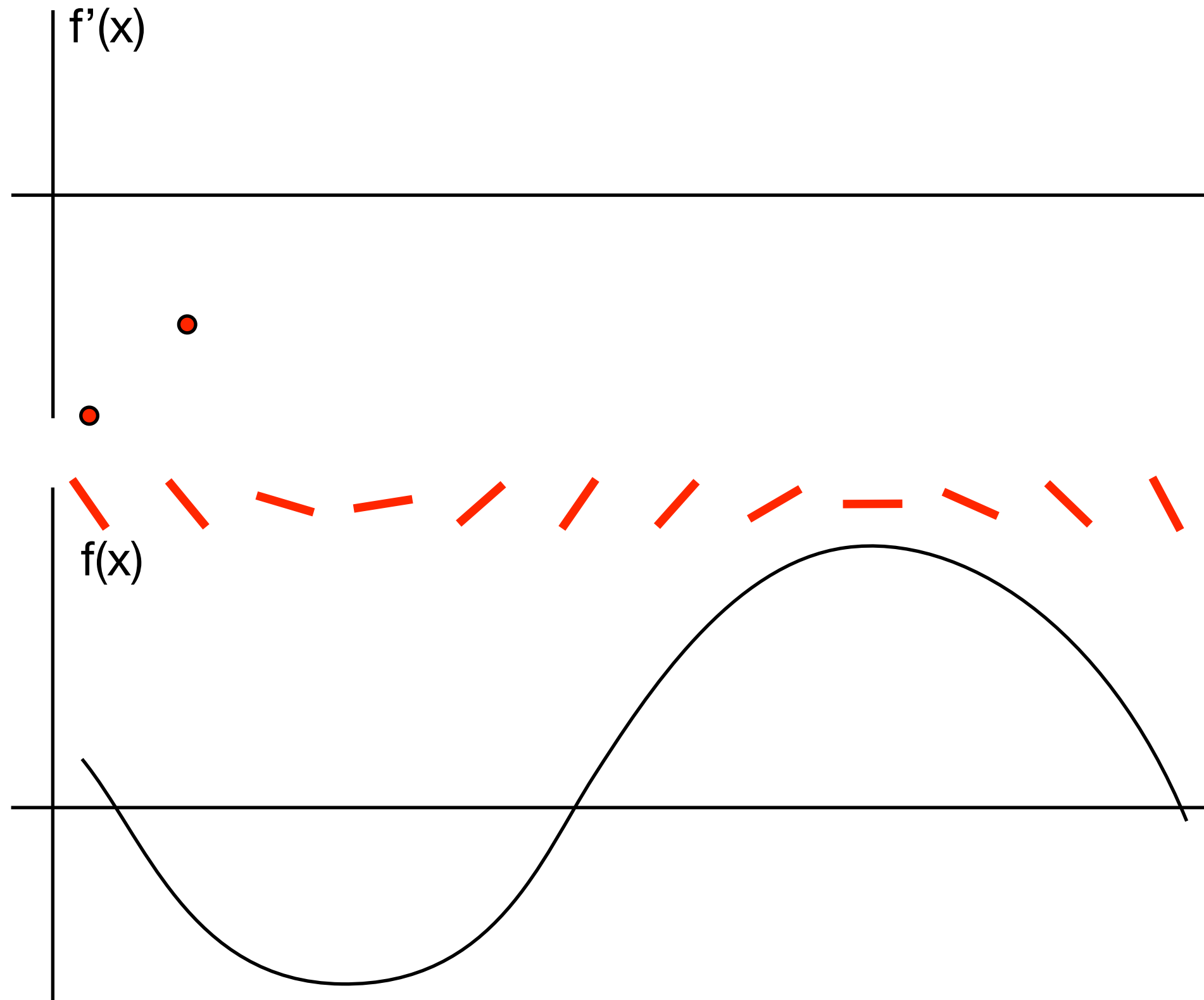
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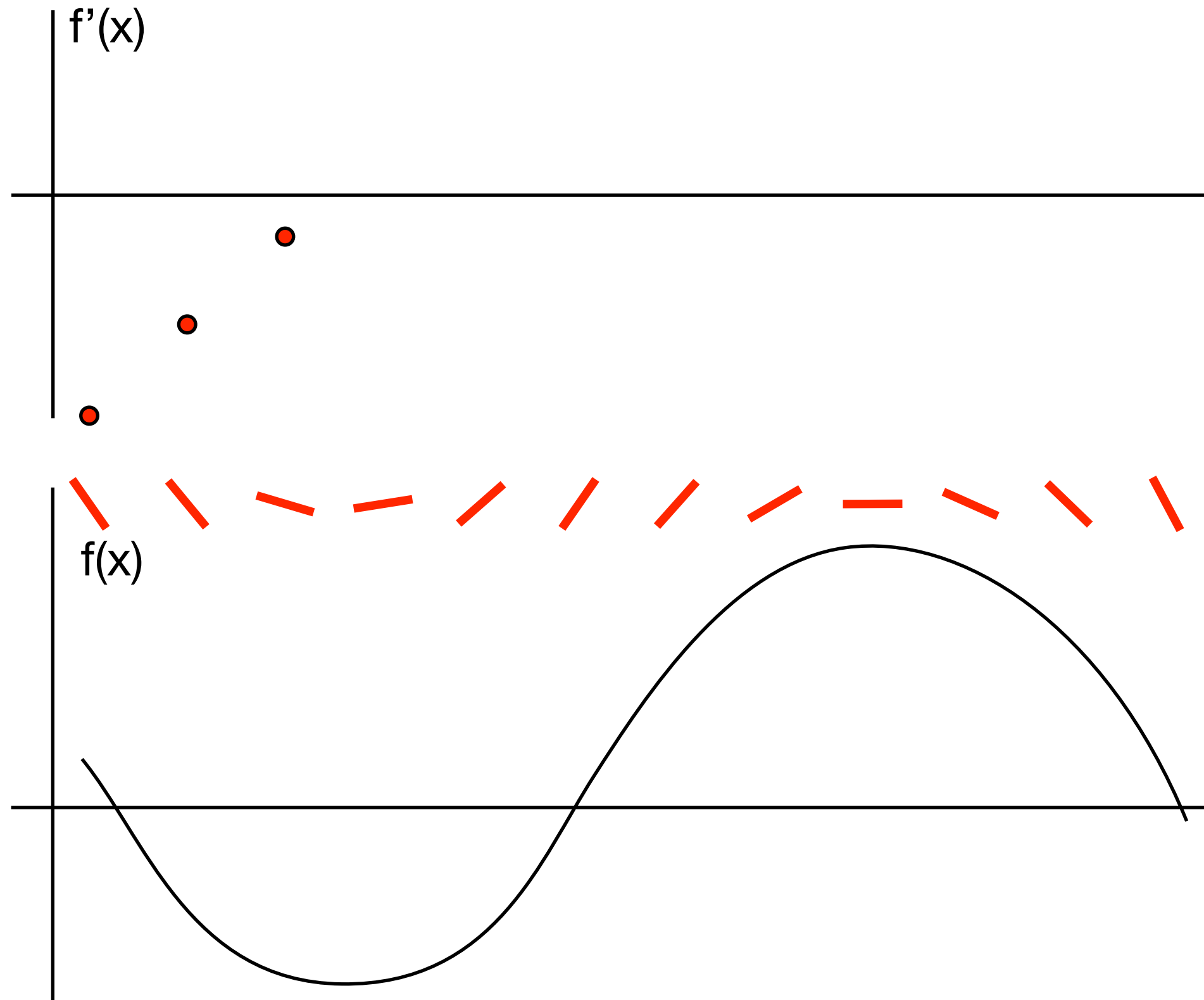
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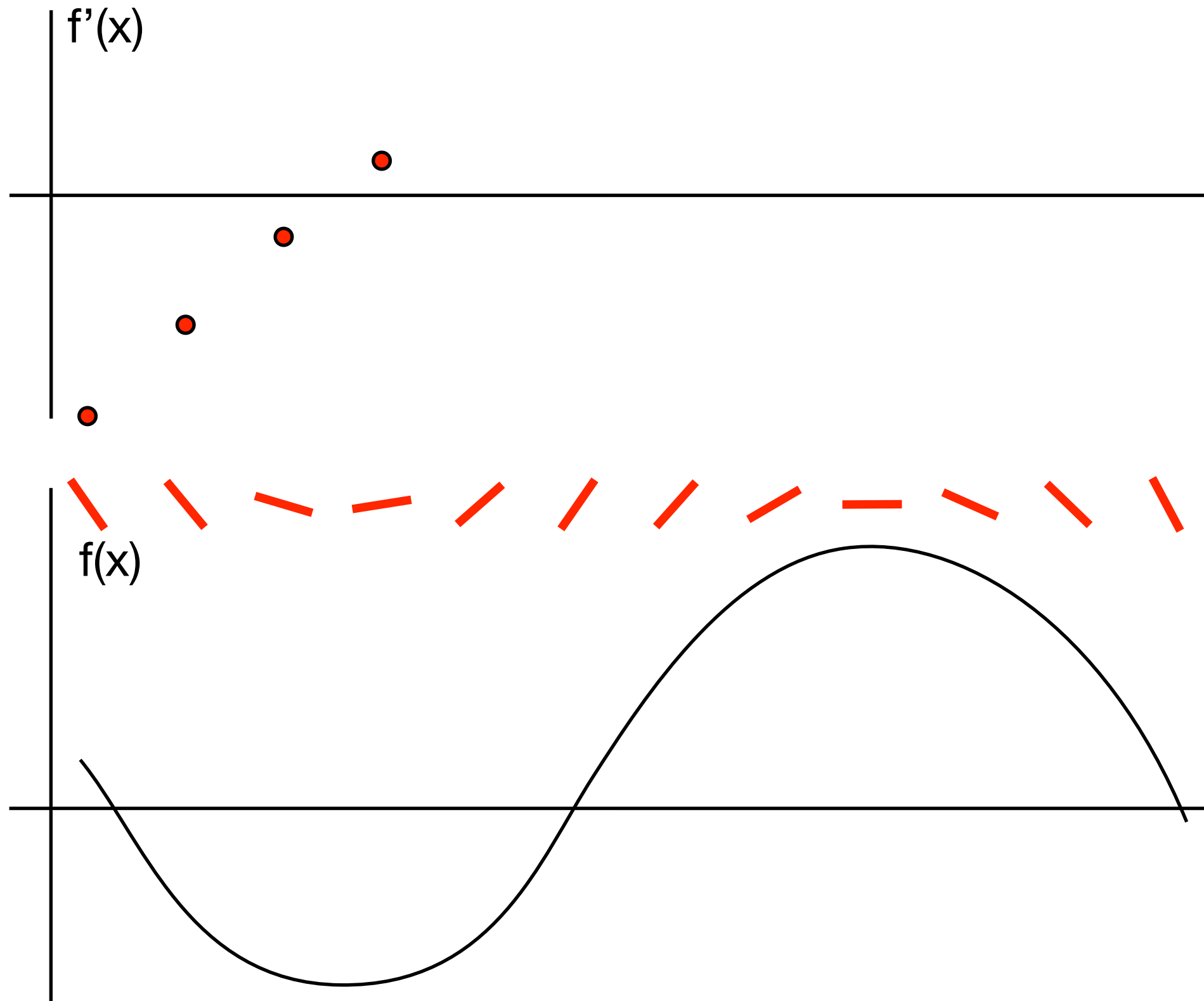
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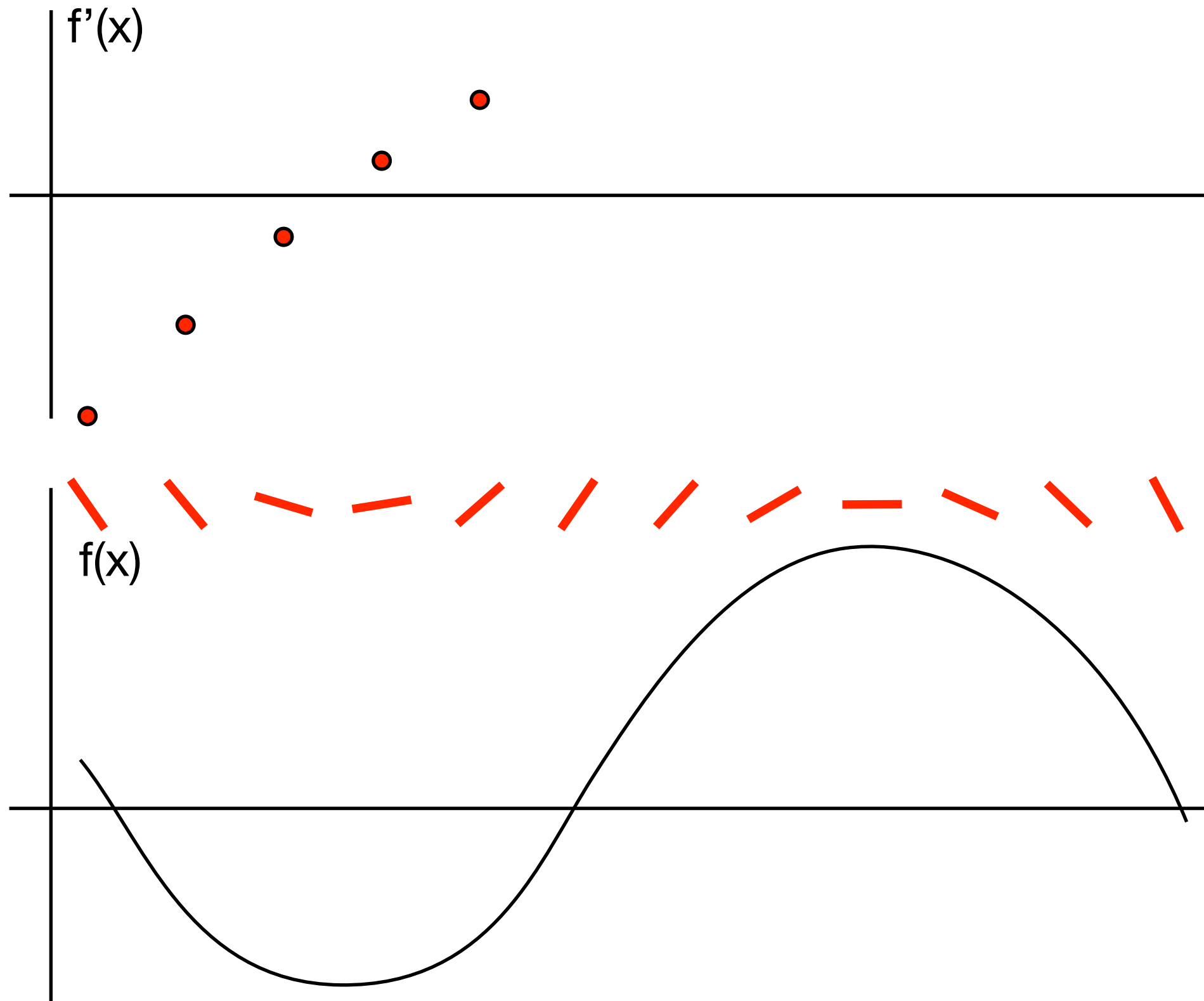
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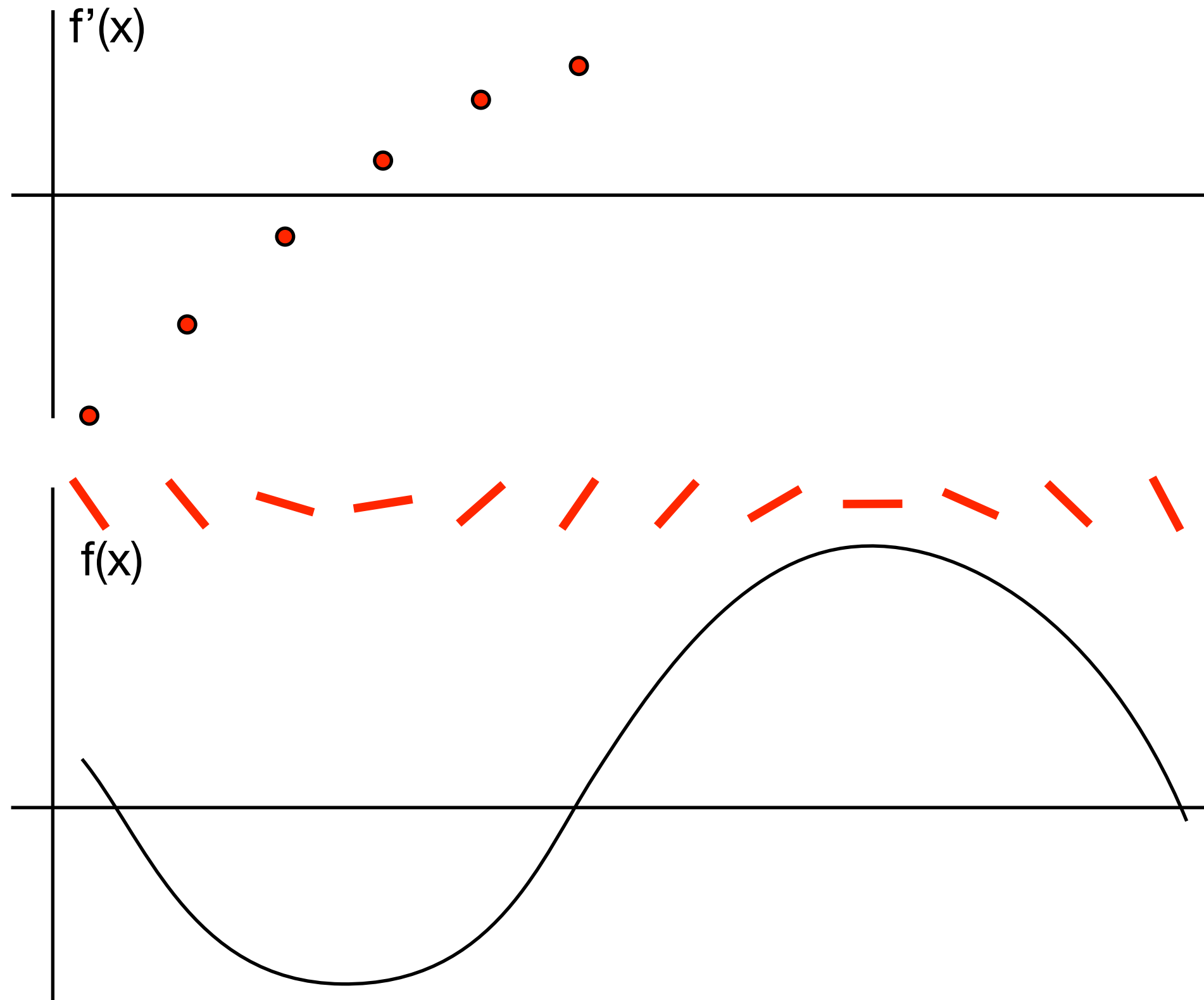
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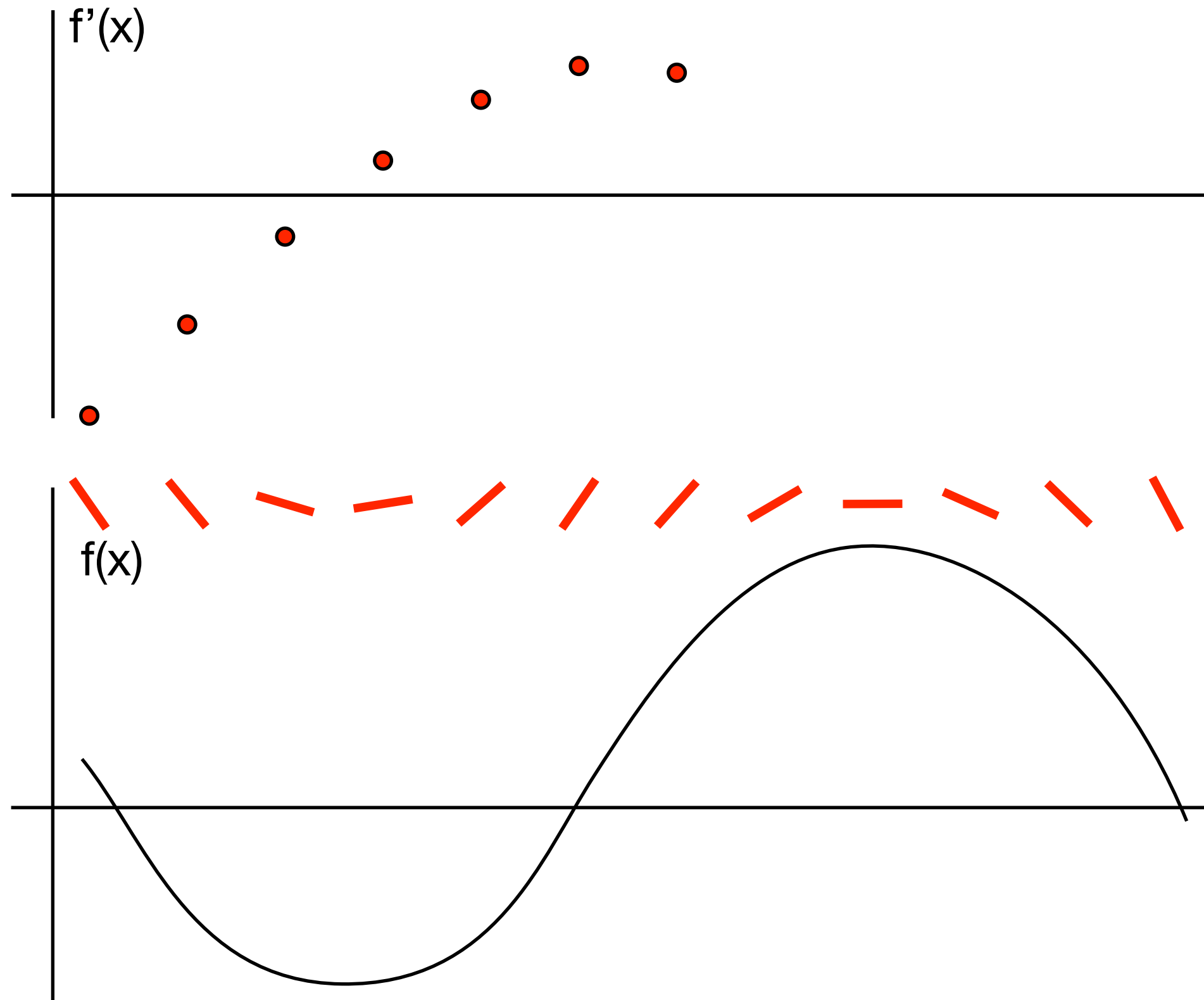
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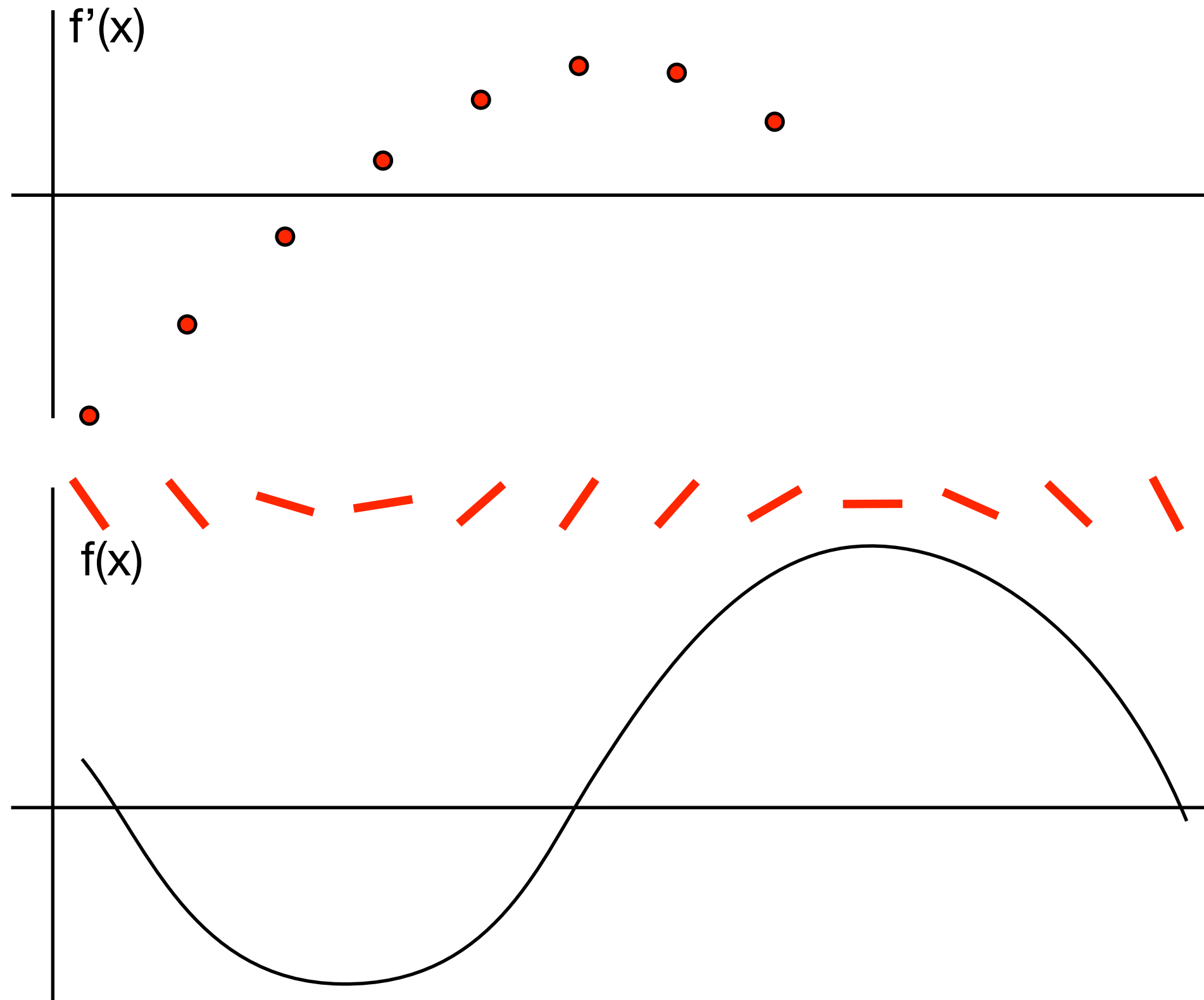
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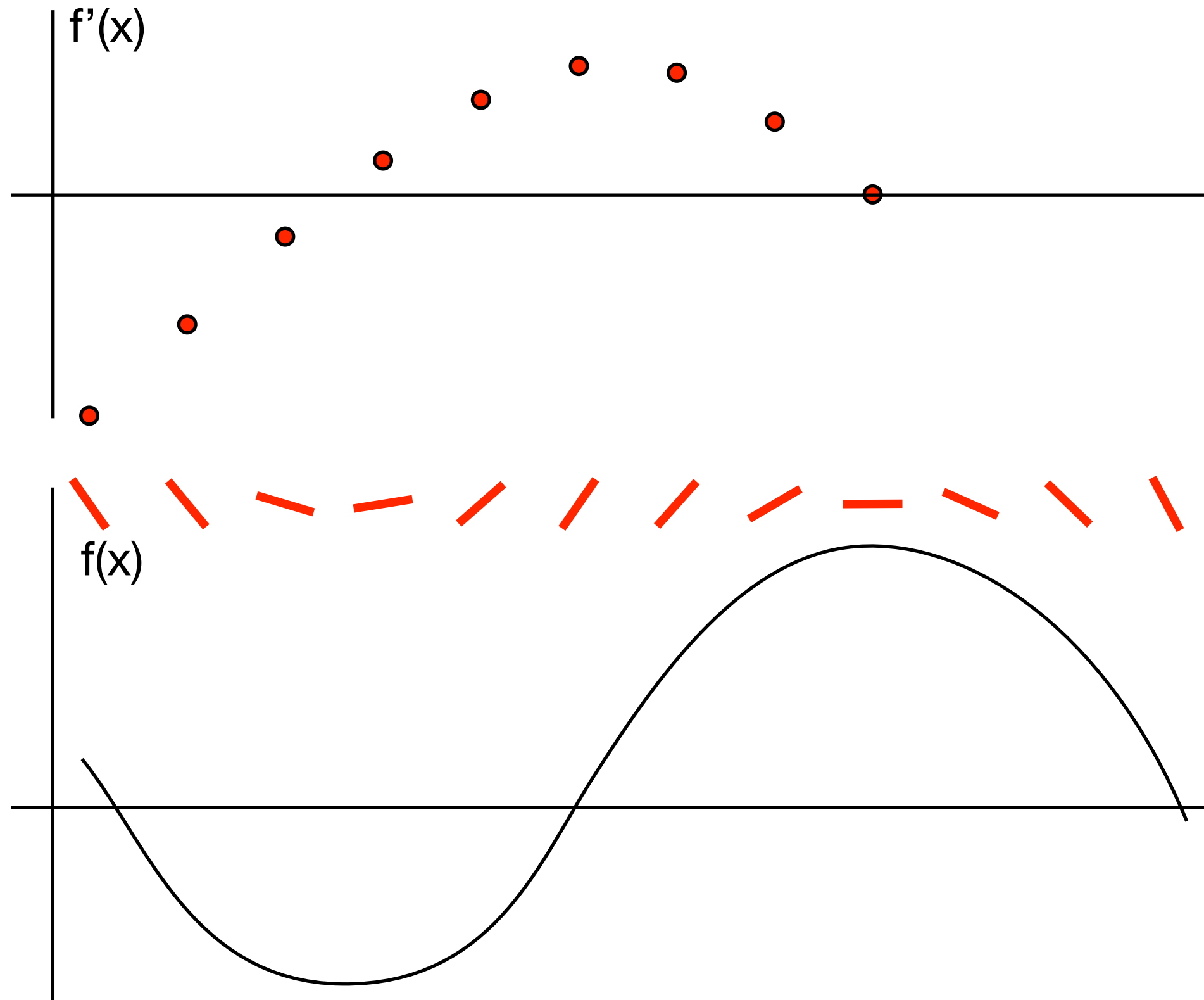
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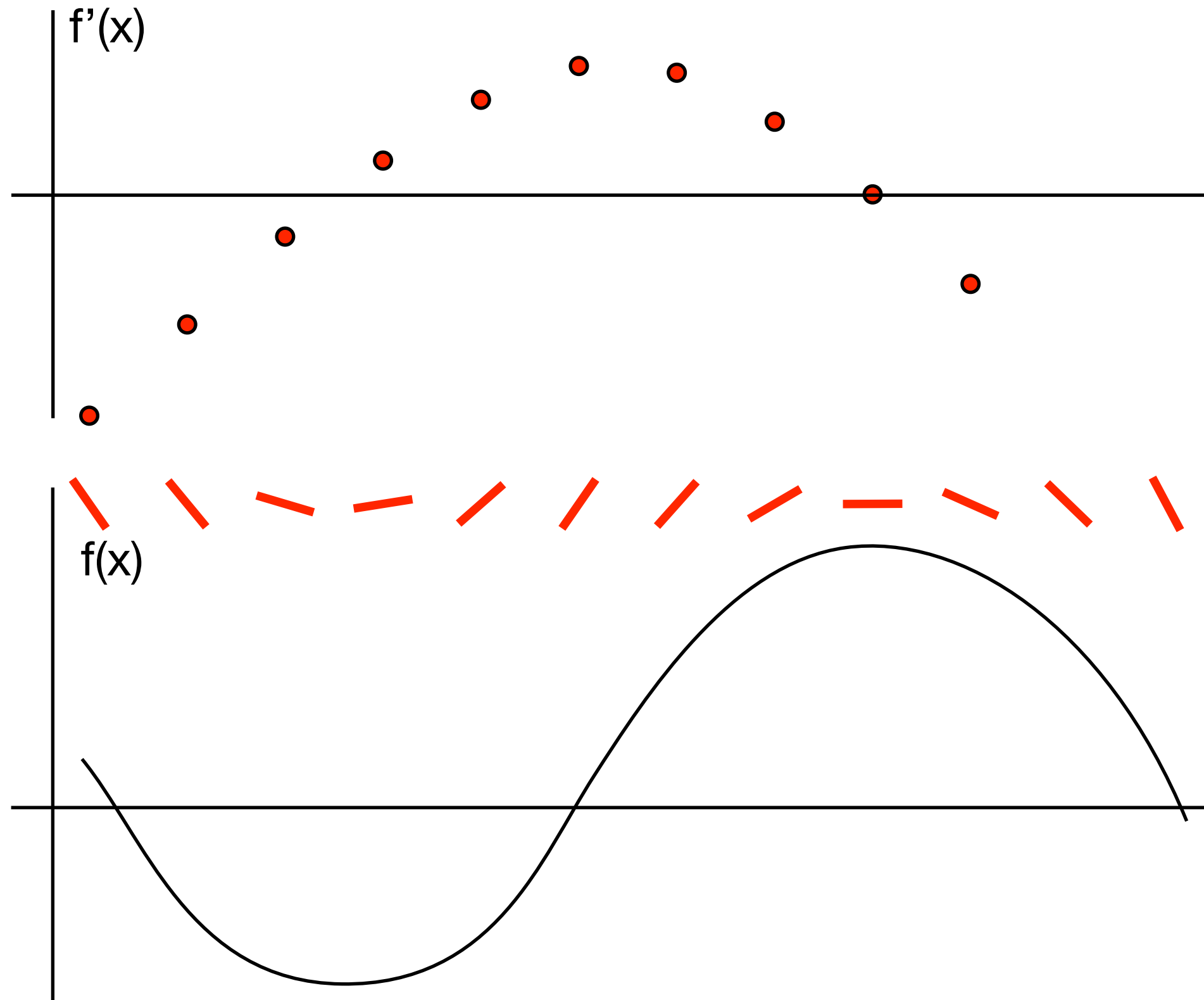
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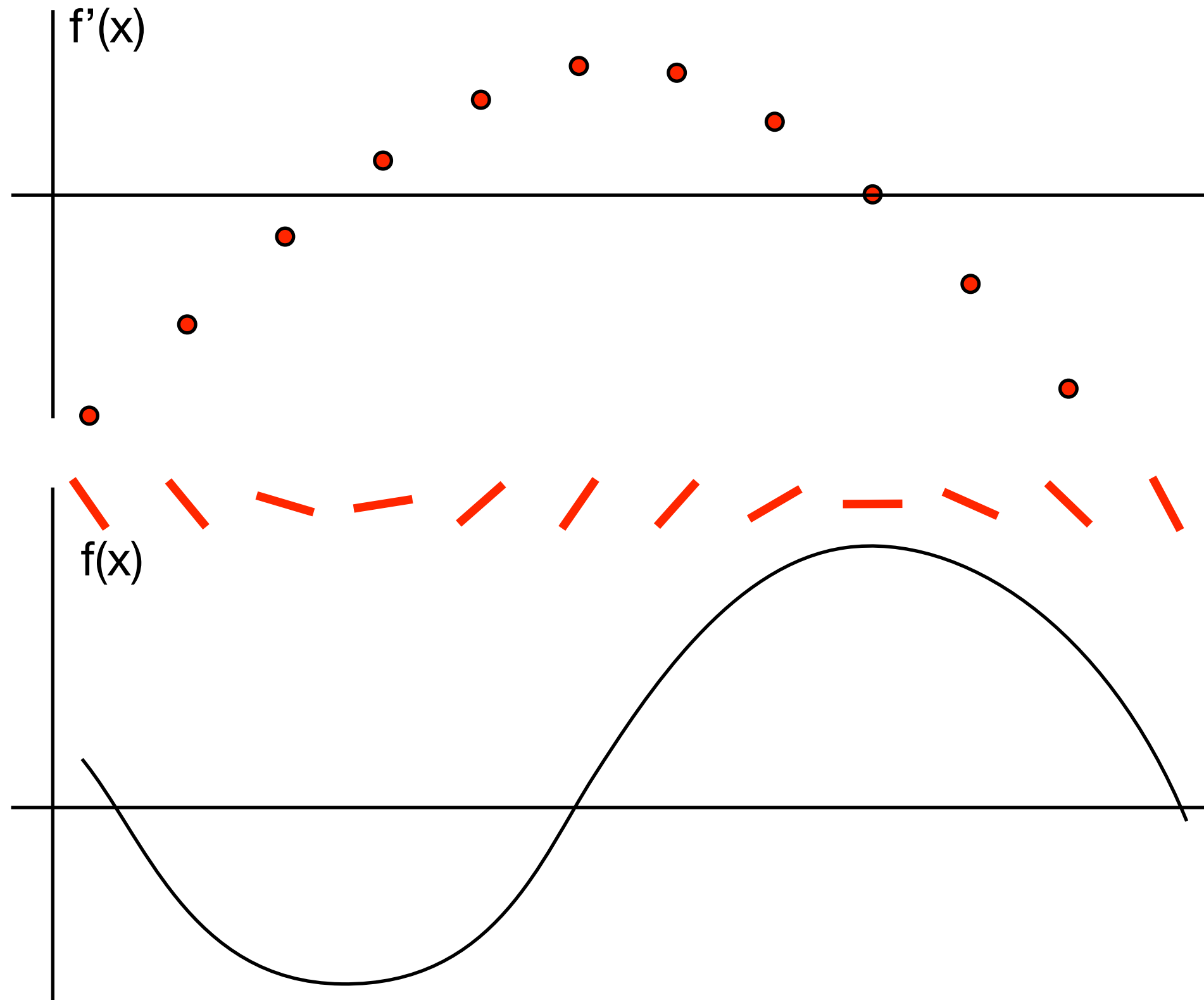
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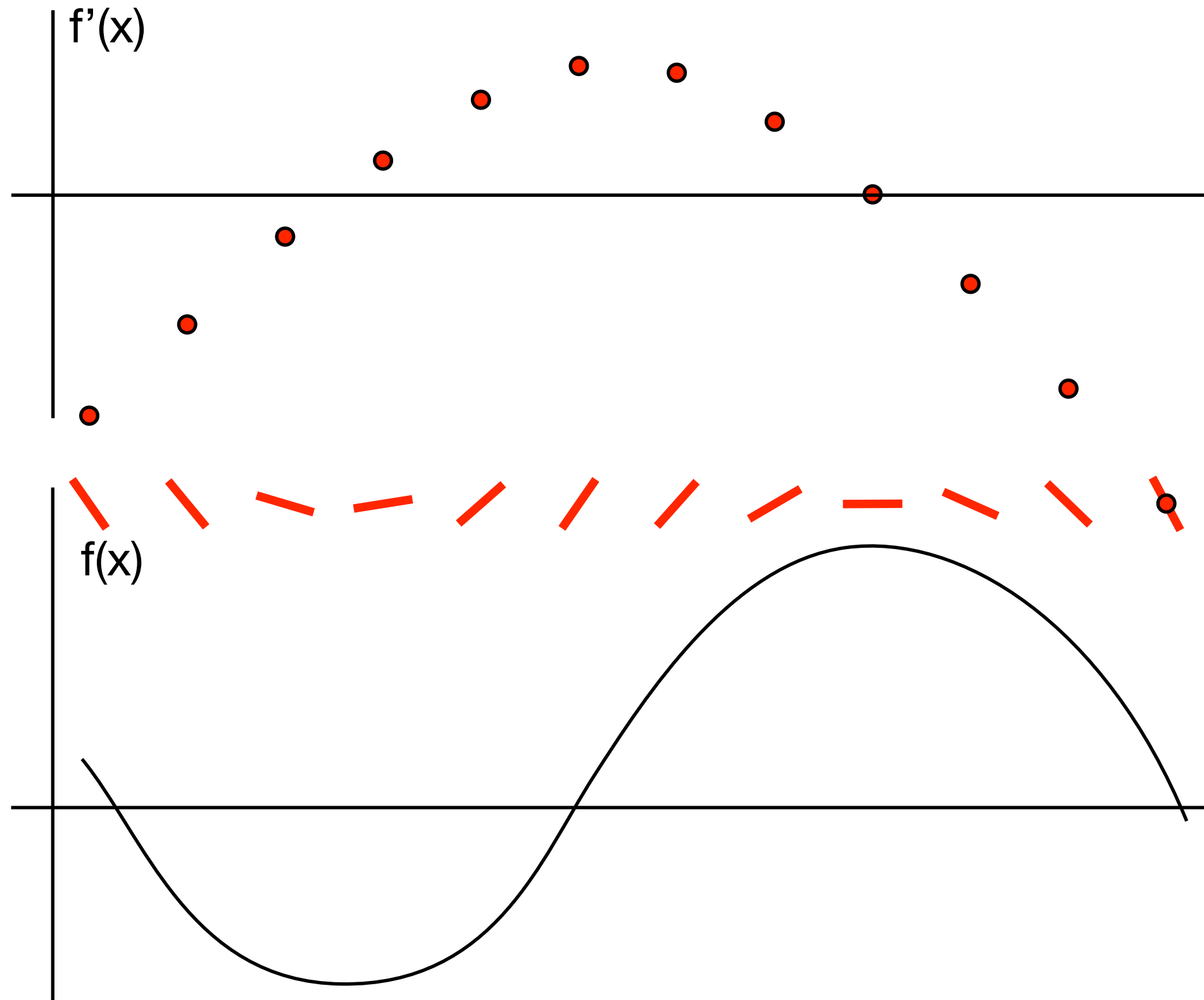
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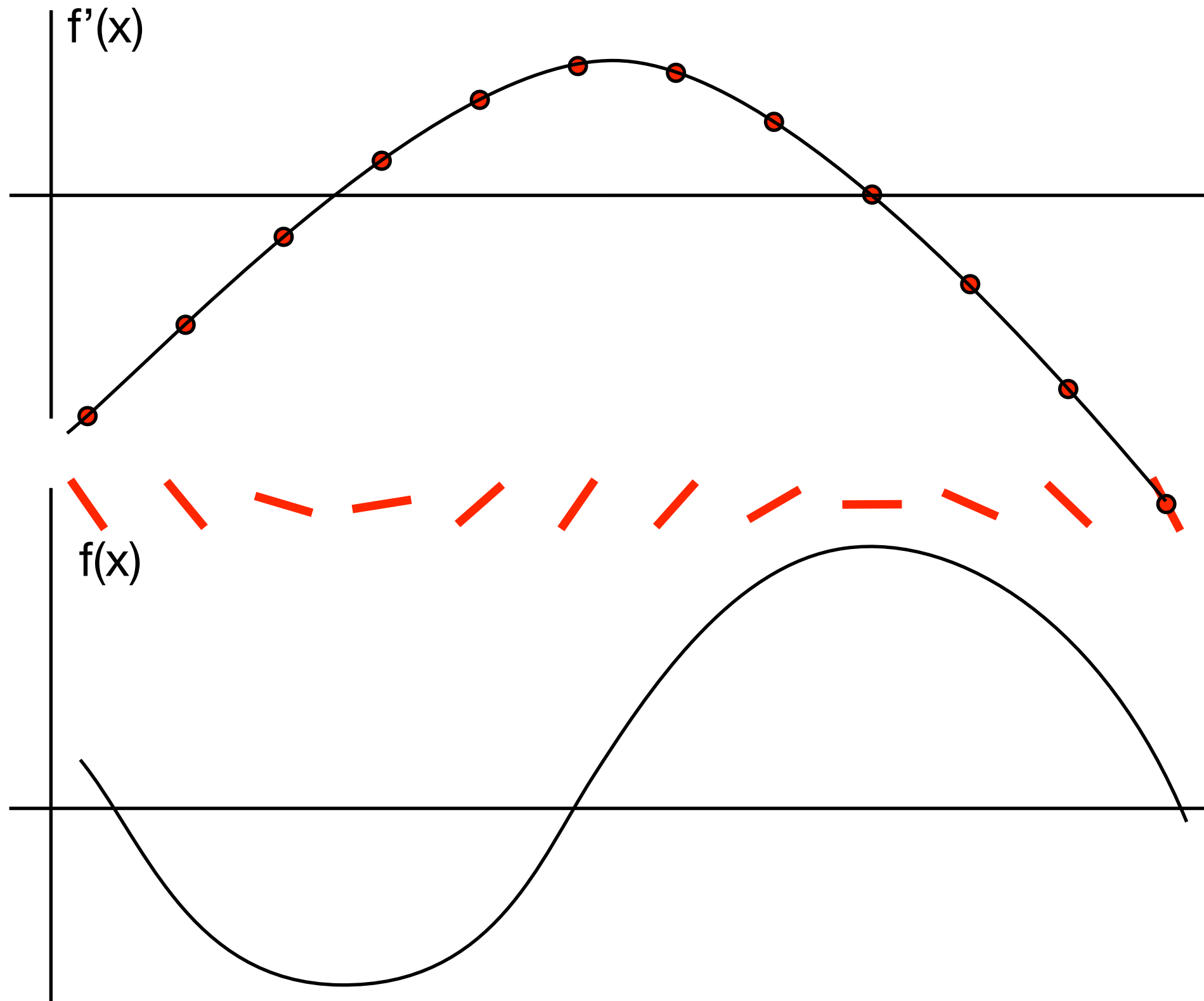
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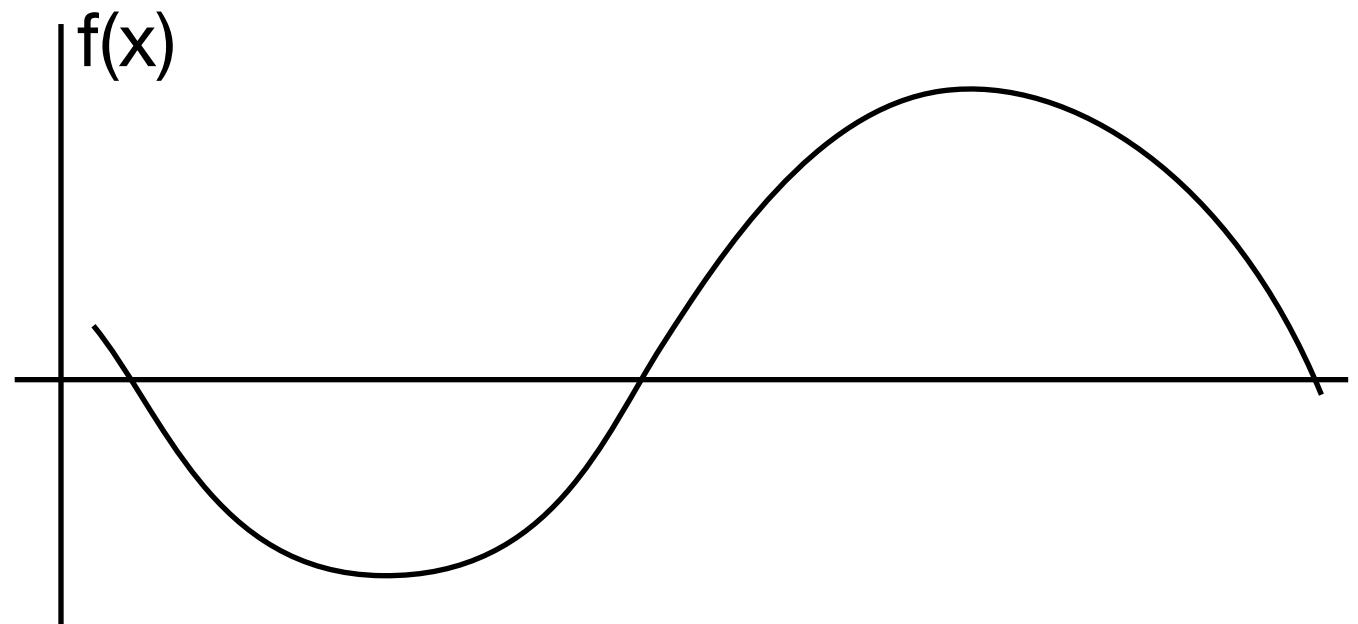
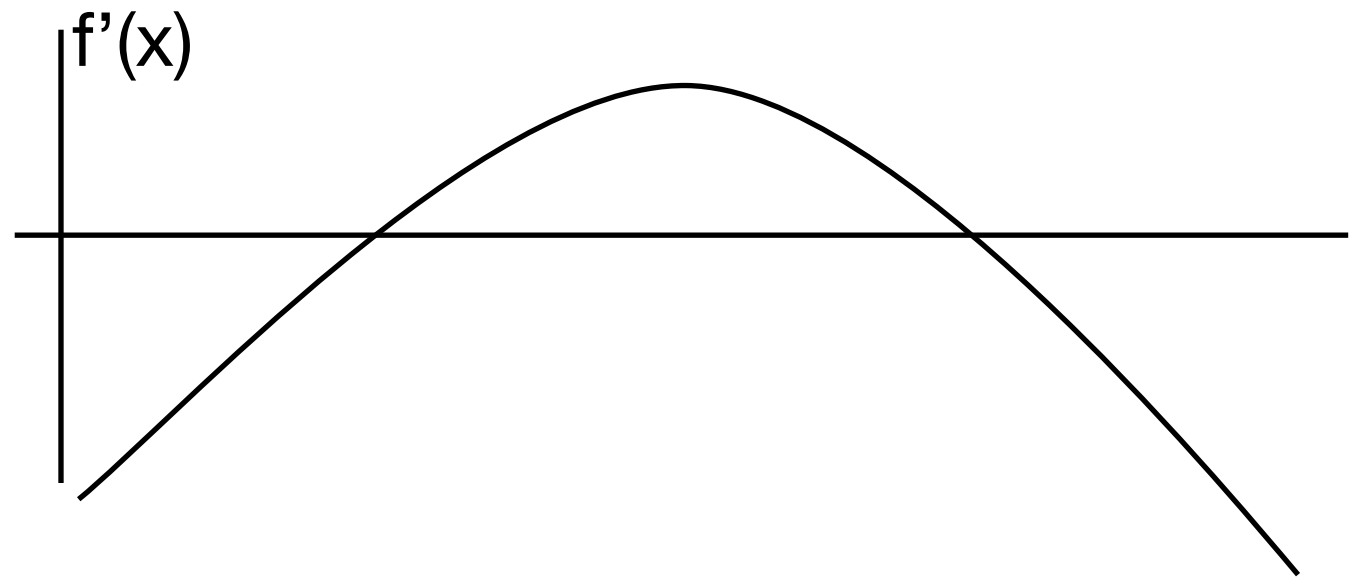


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Graphing $f'(x)$ - true or false

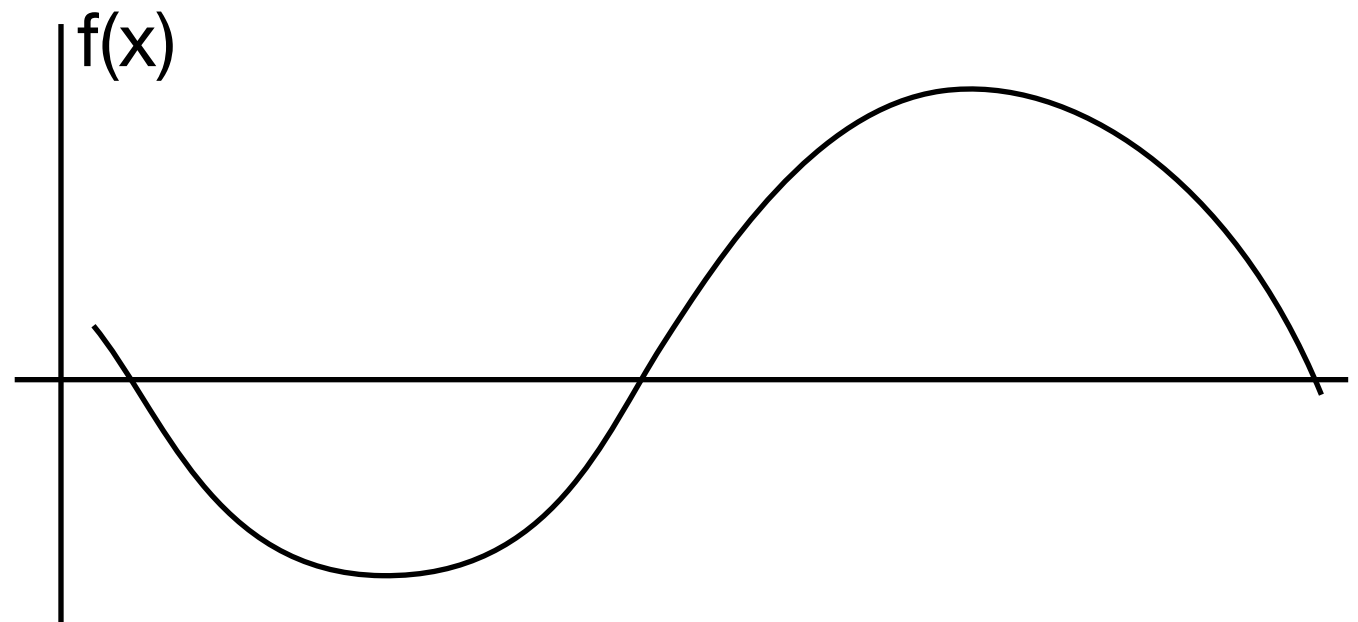
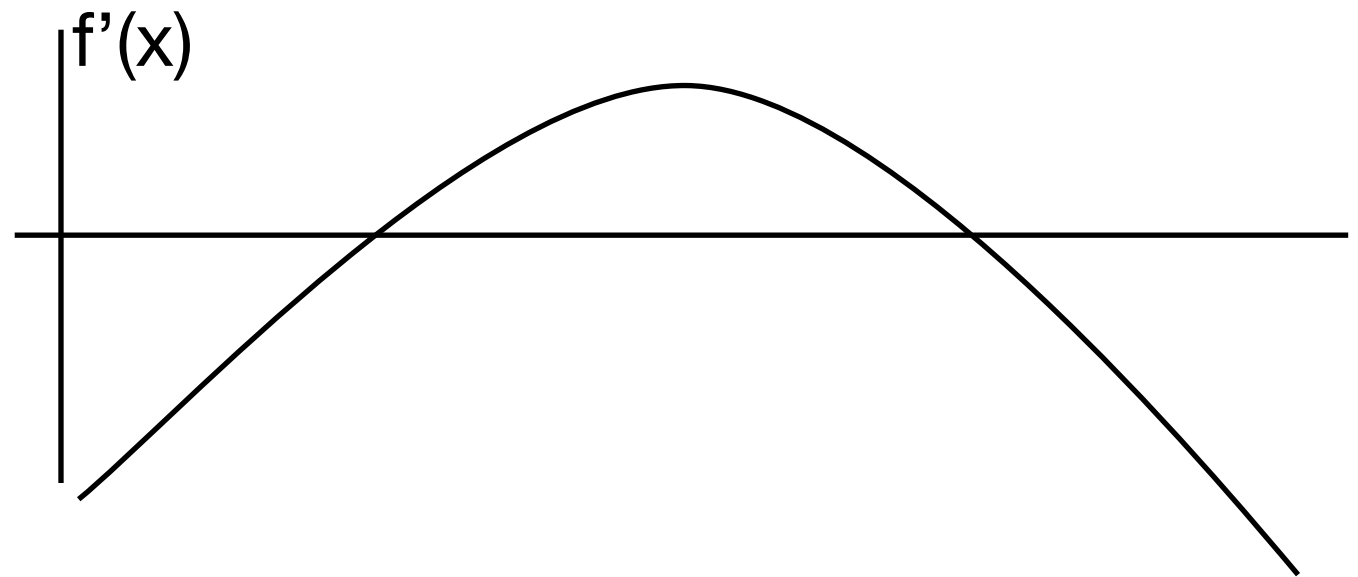
- It is a coincidence that $f(x)$ has a maximum value at the same value of x at which $f'(x)$ has a zero.
- (A) True. (B) False. (E) DK.



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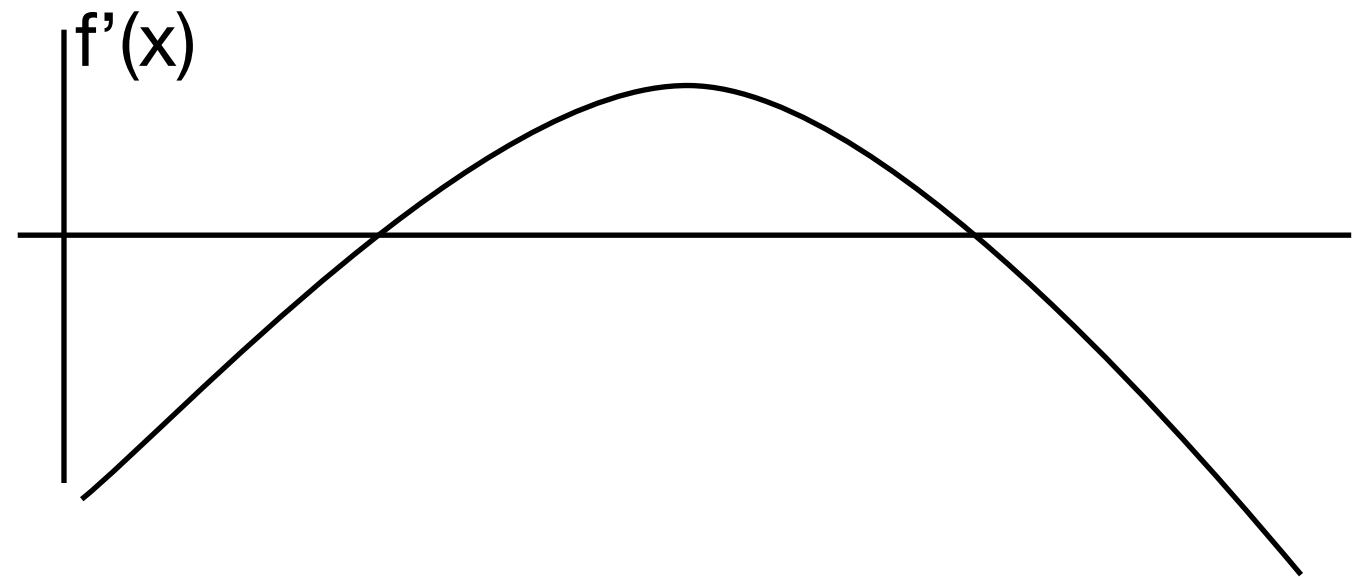
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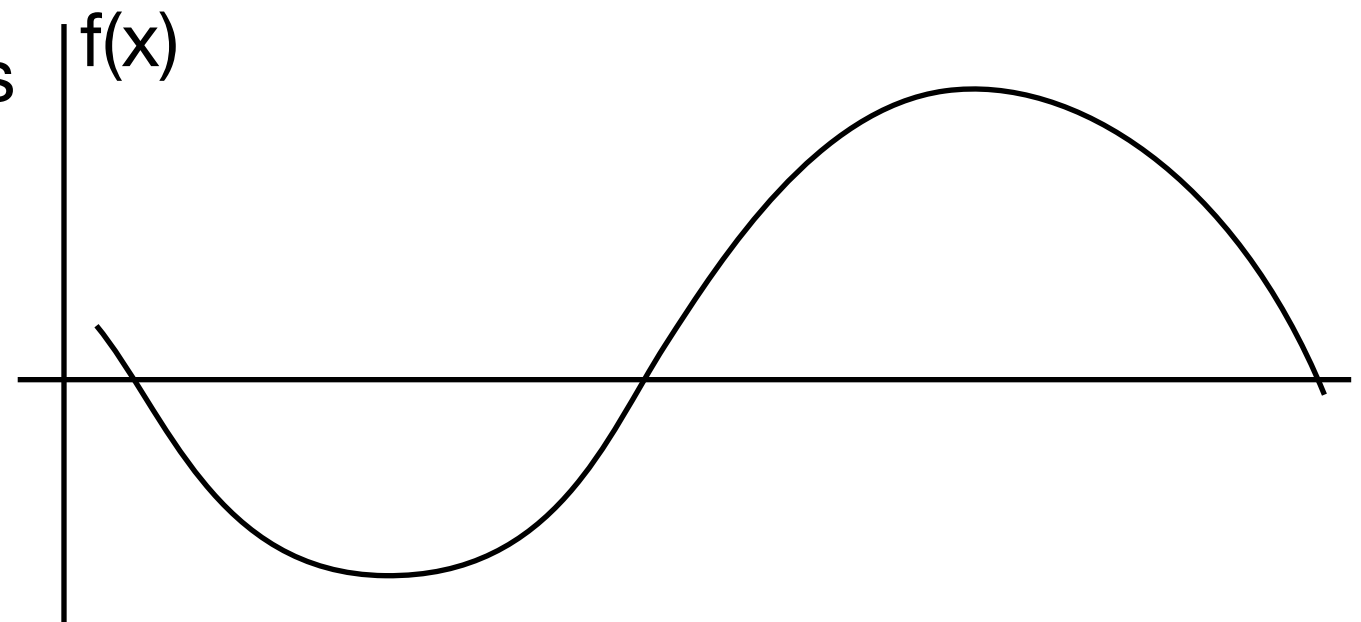
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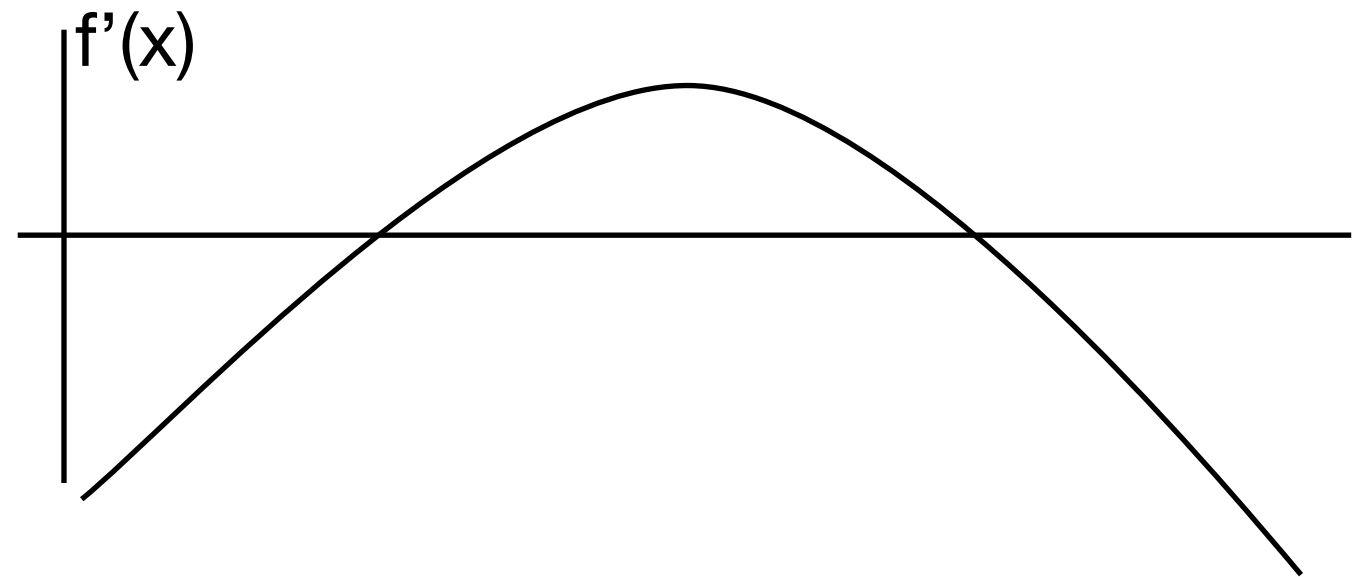
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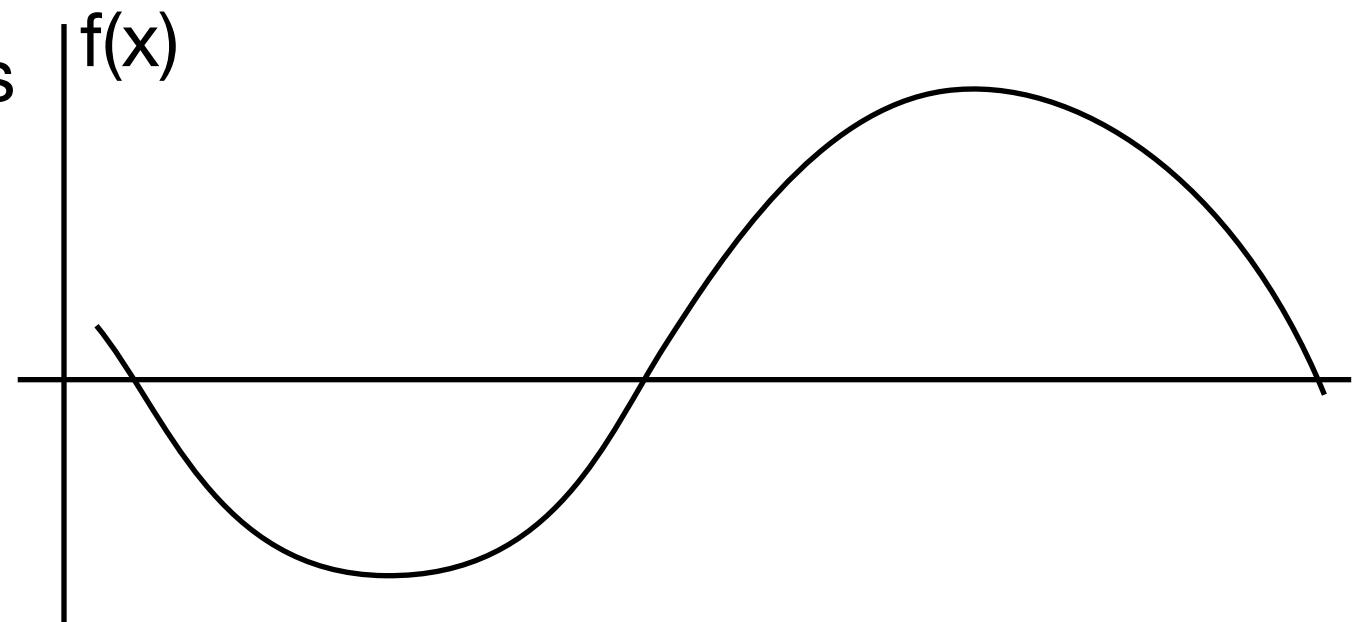
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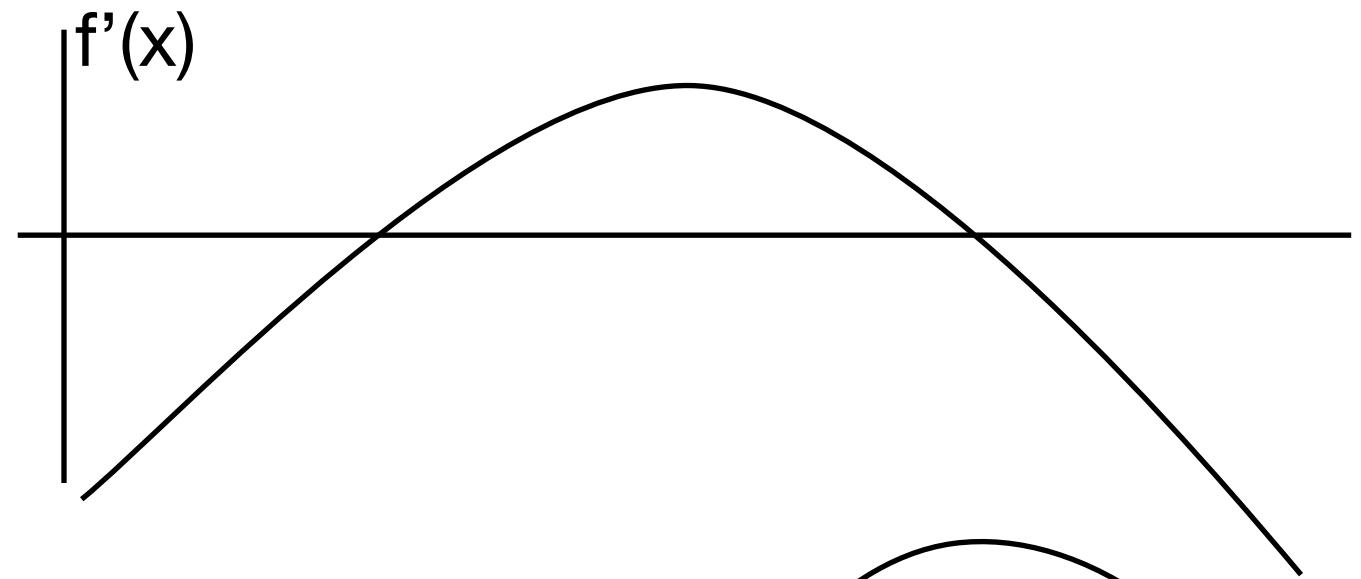


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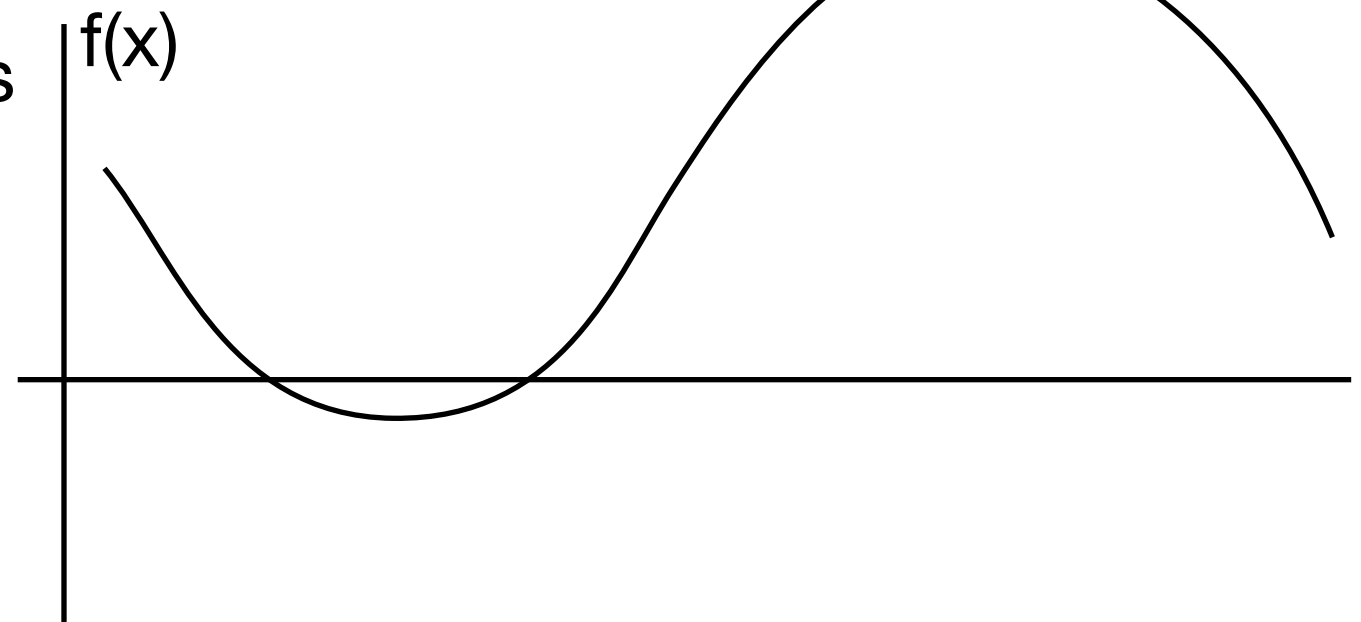
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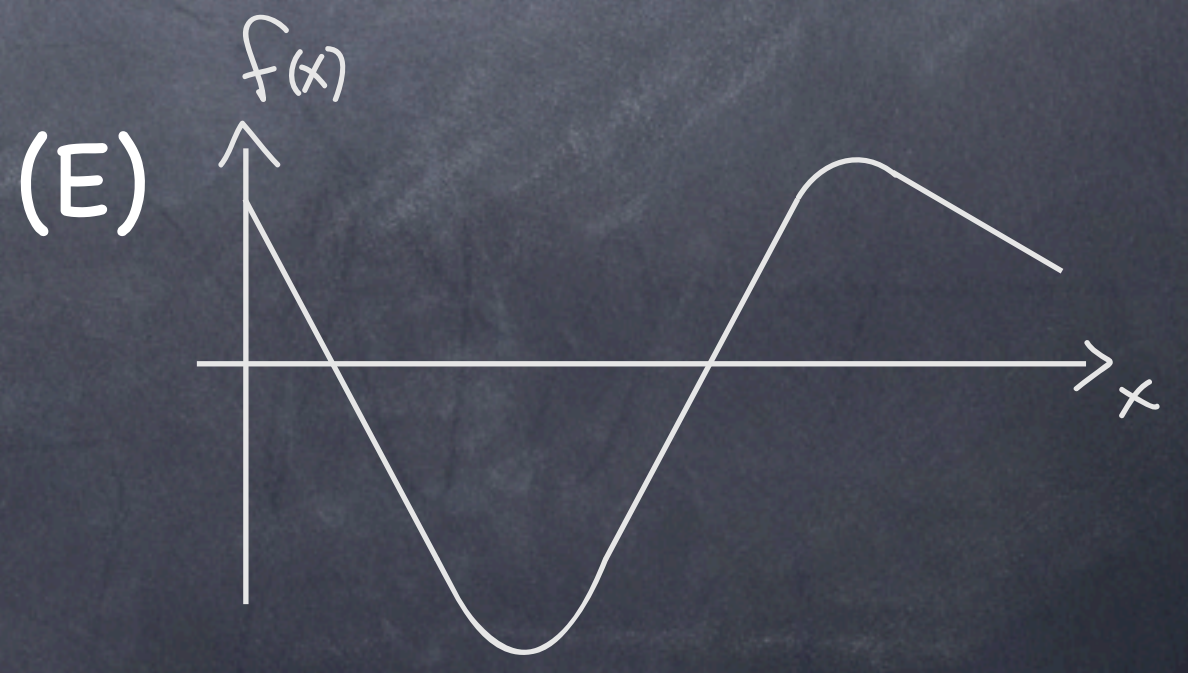
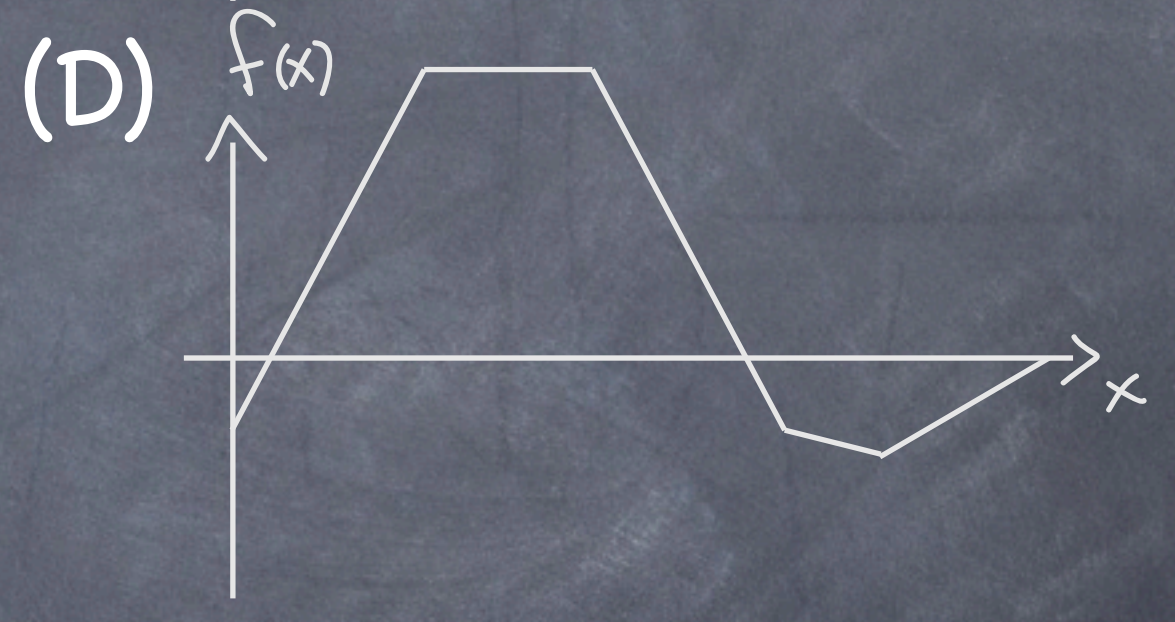
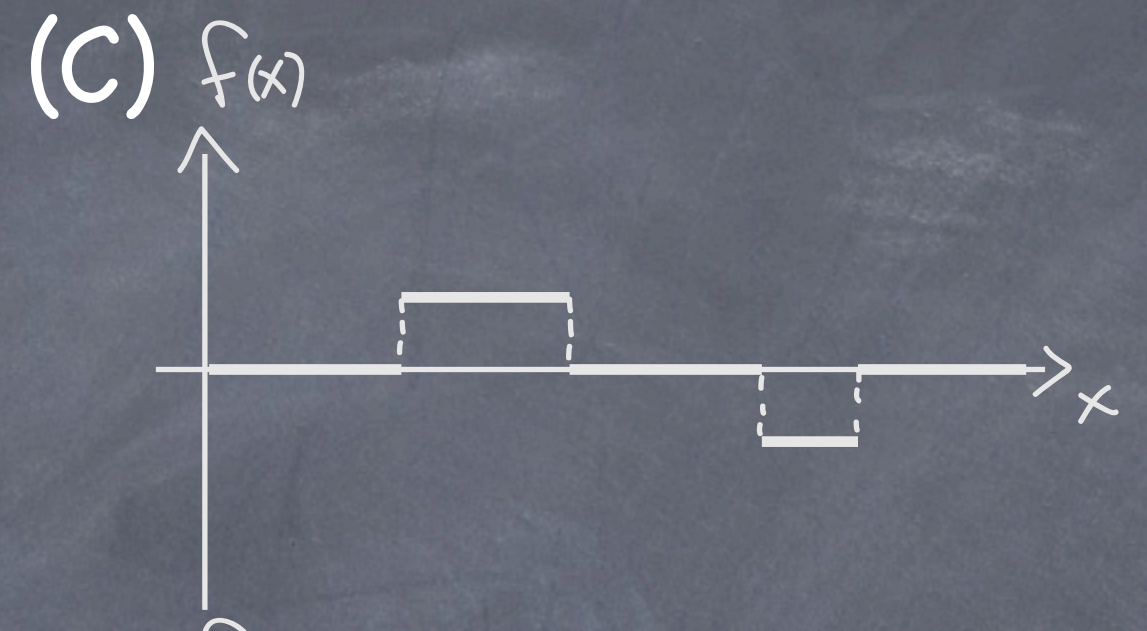
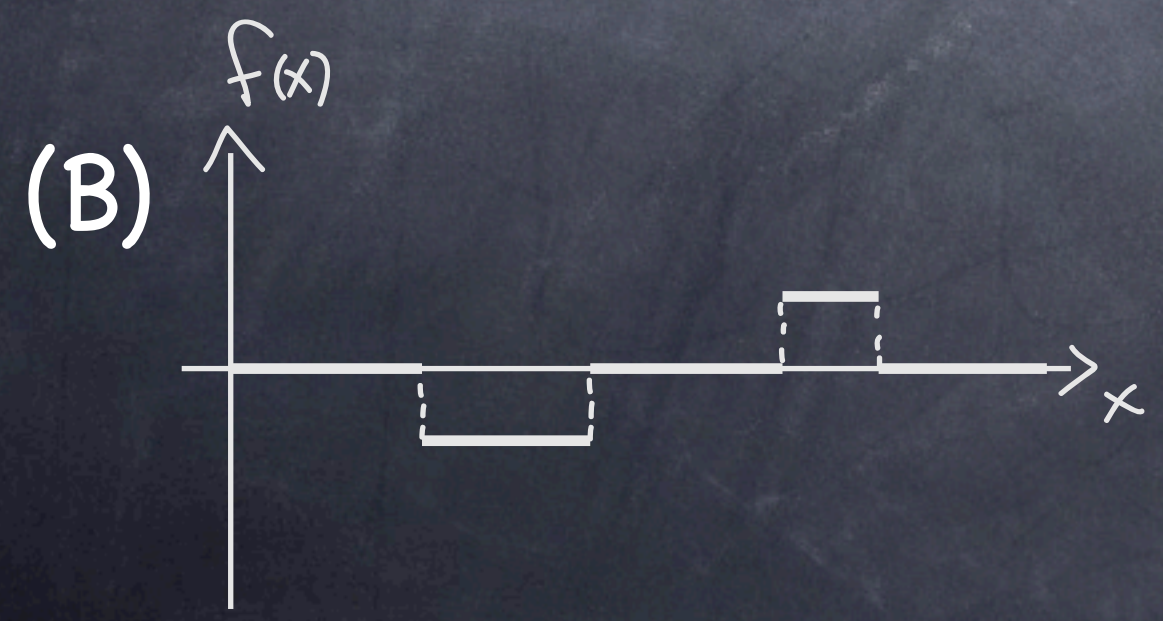
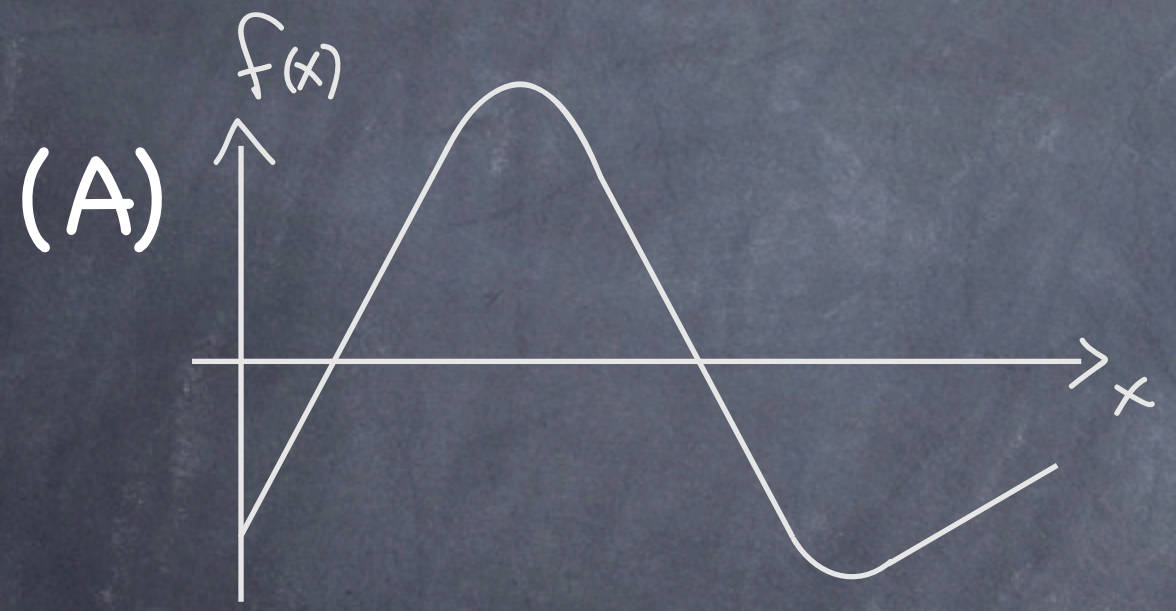
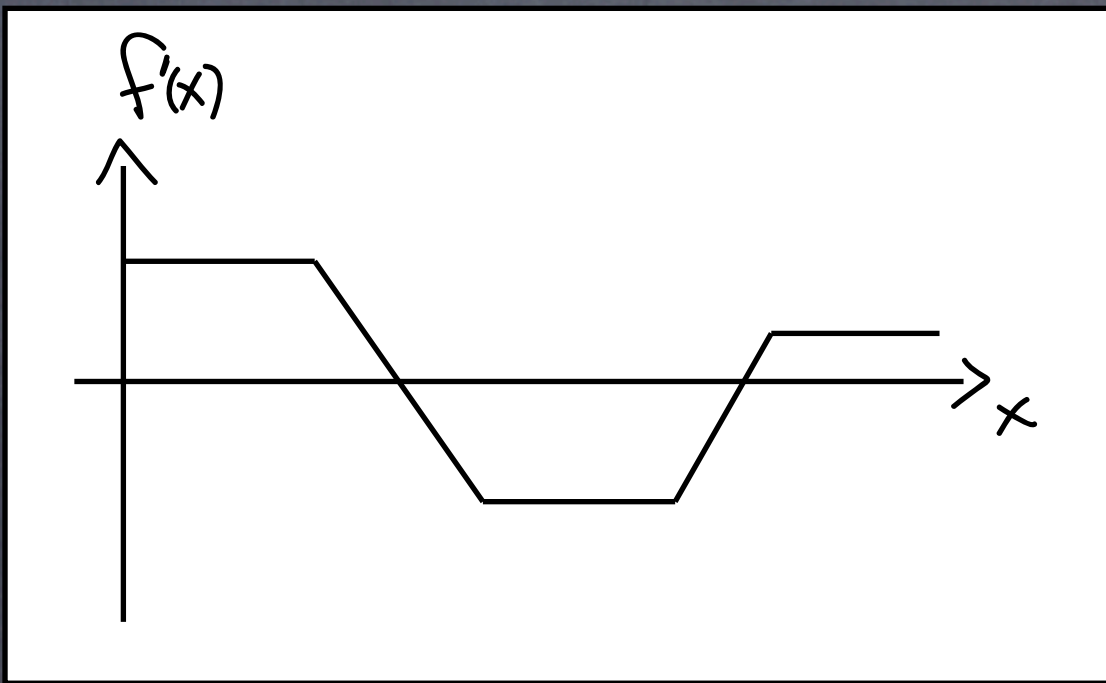
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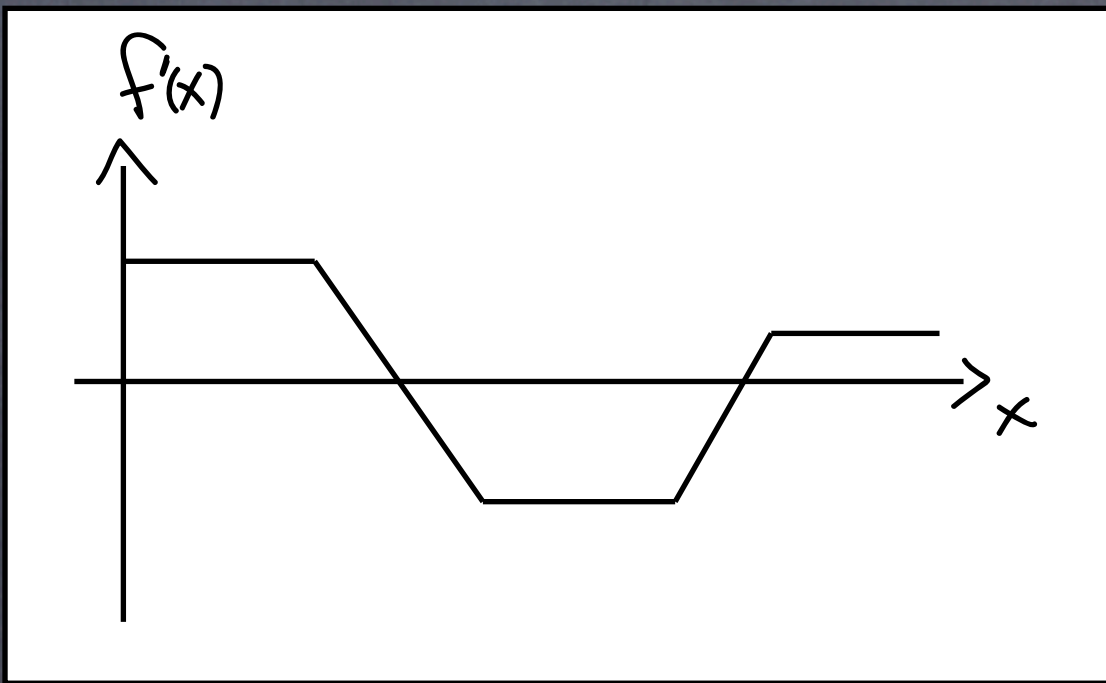


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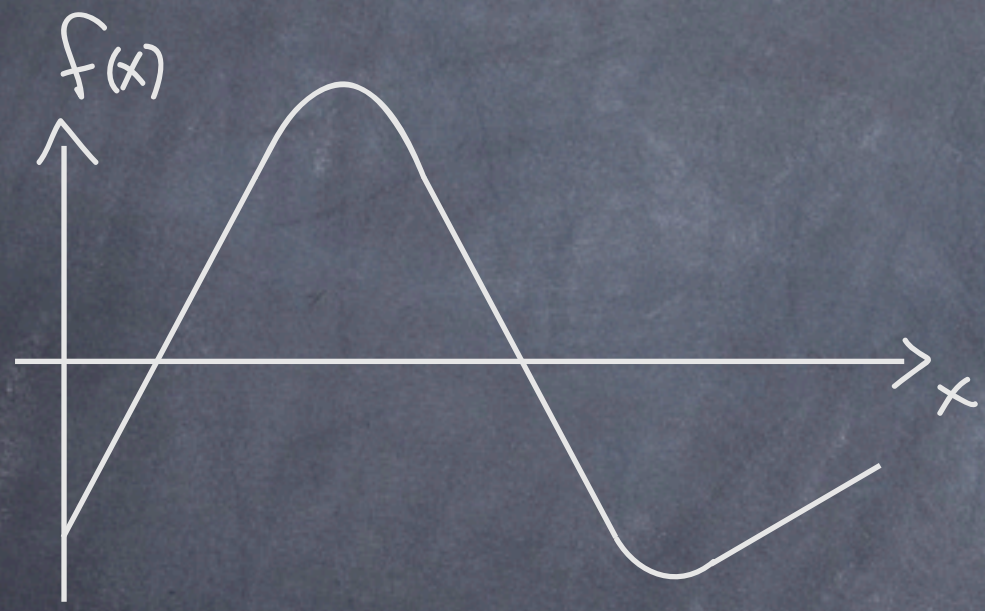
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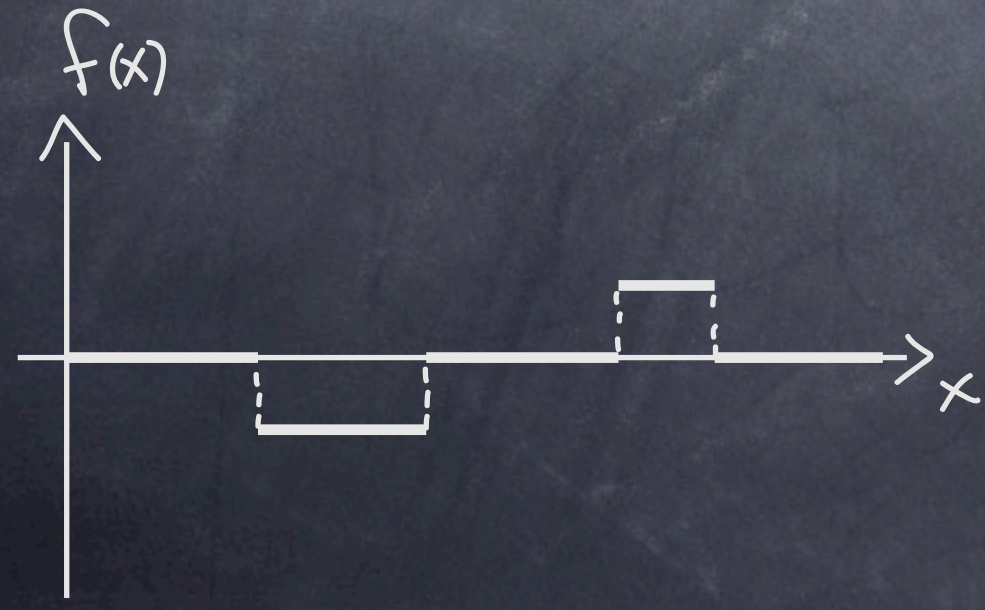




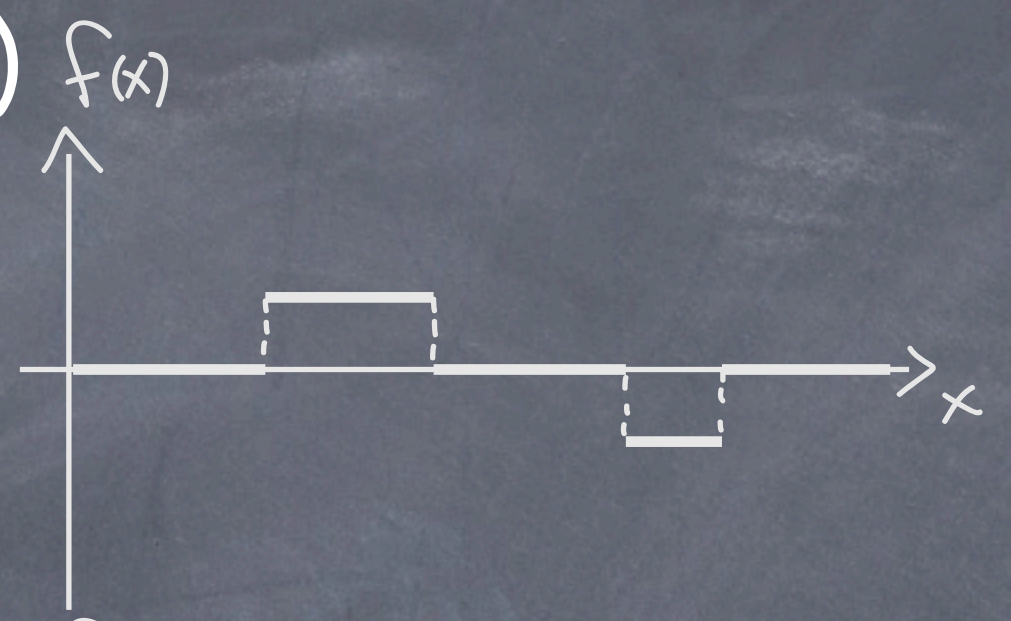
(A)



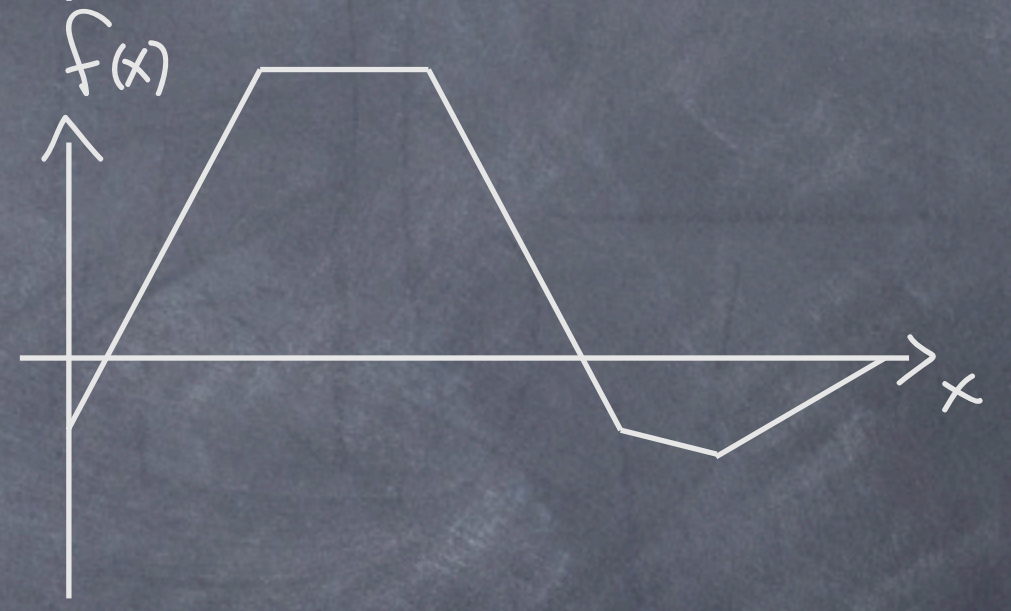
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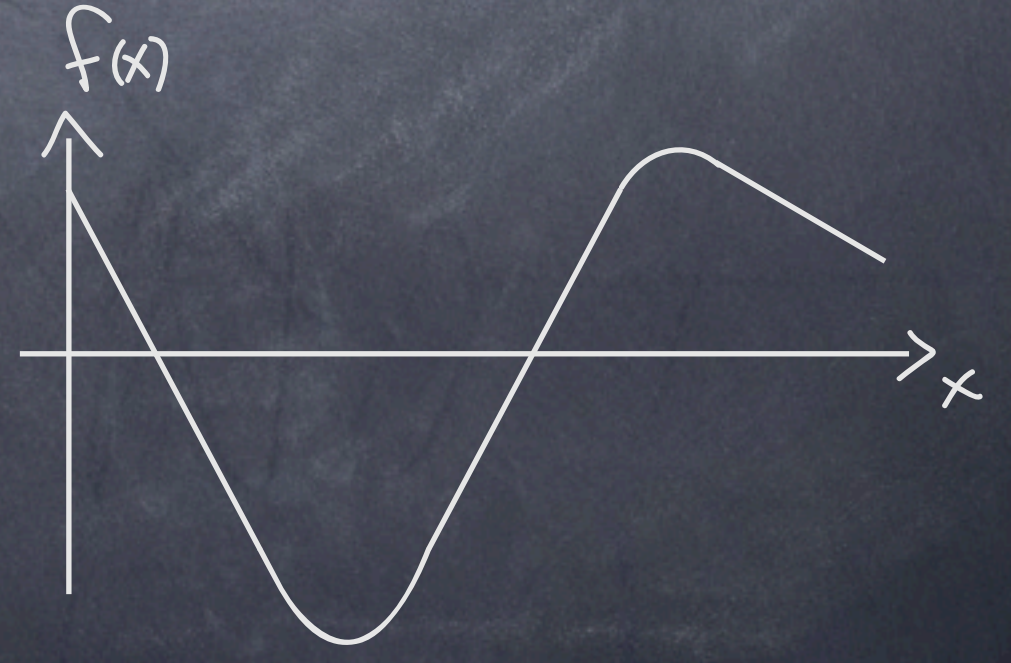
(C)

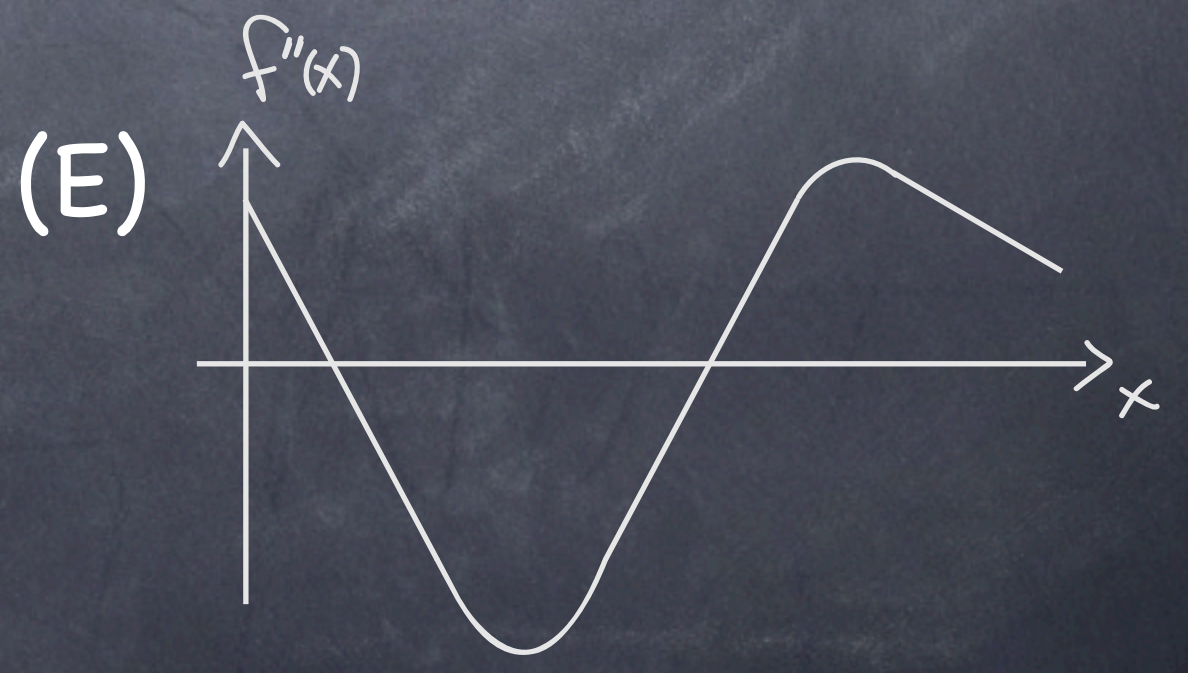
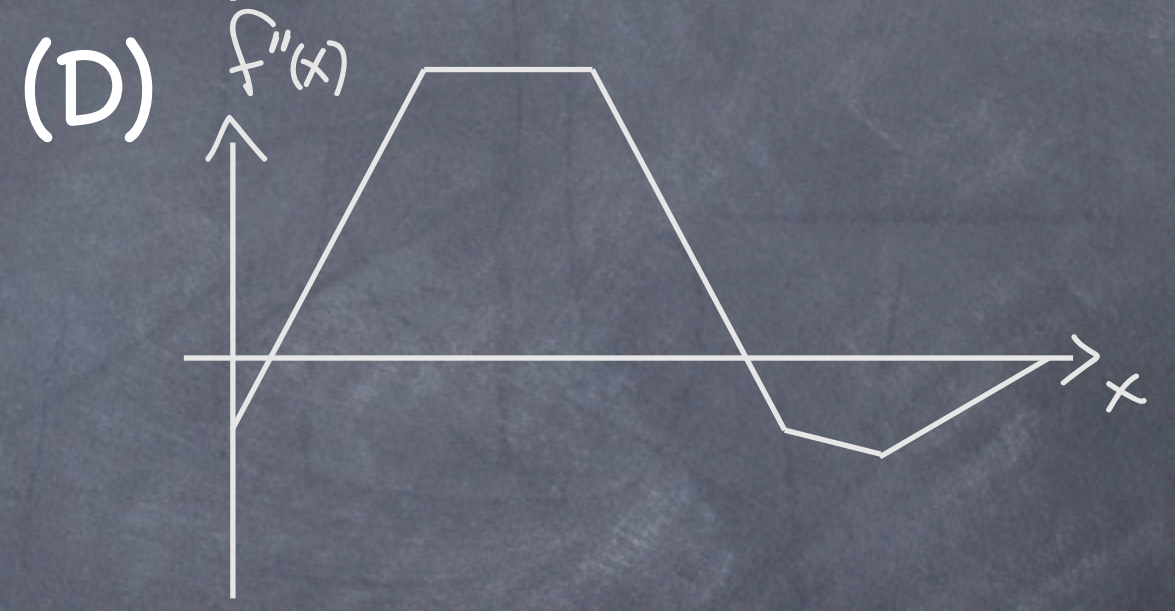
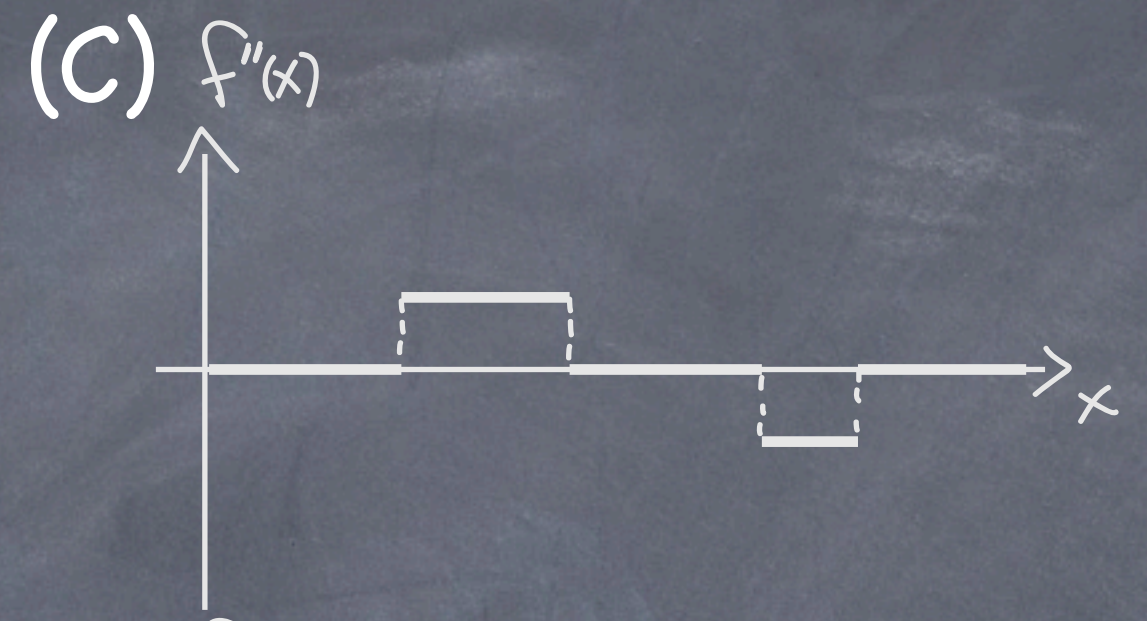
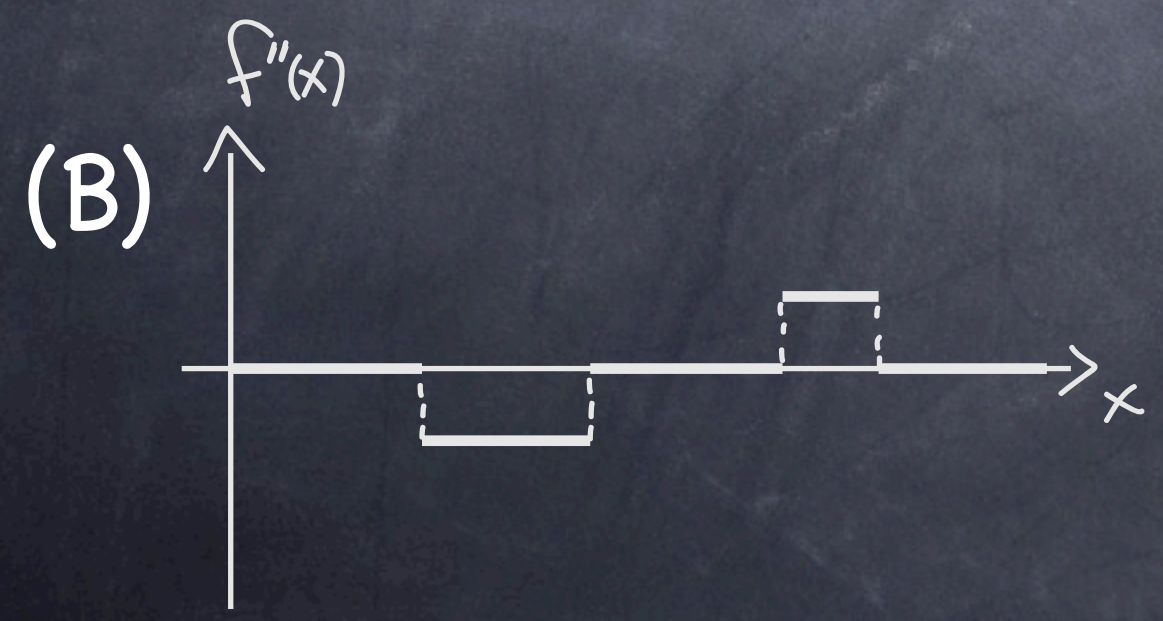
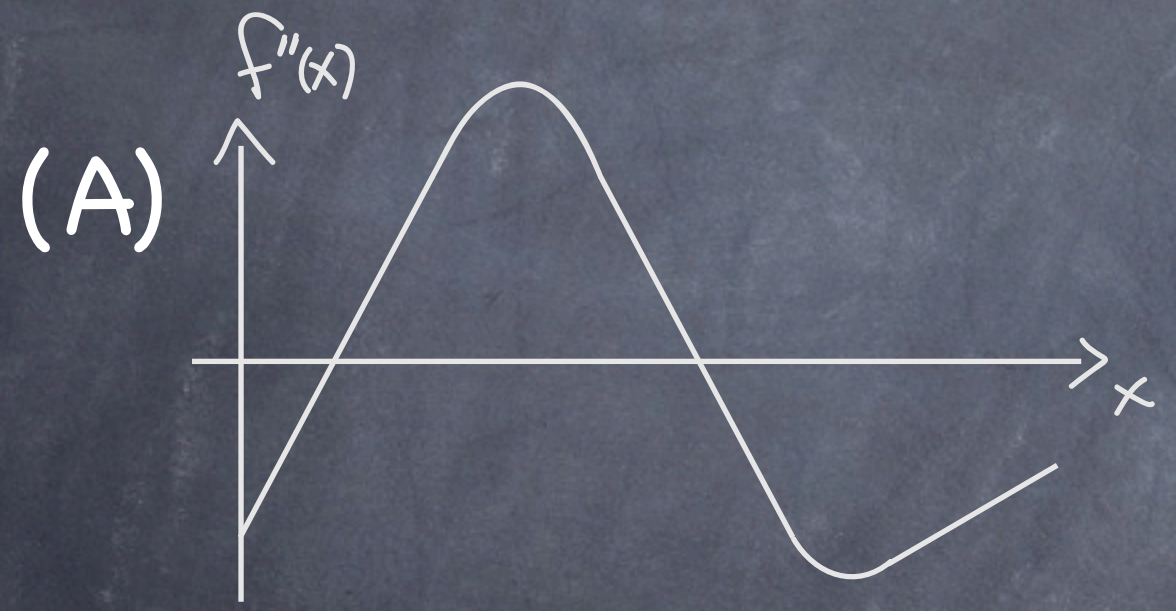
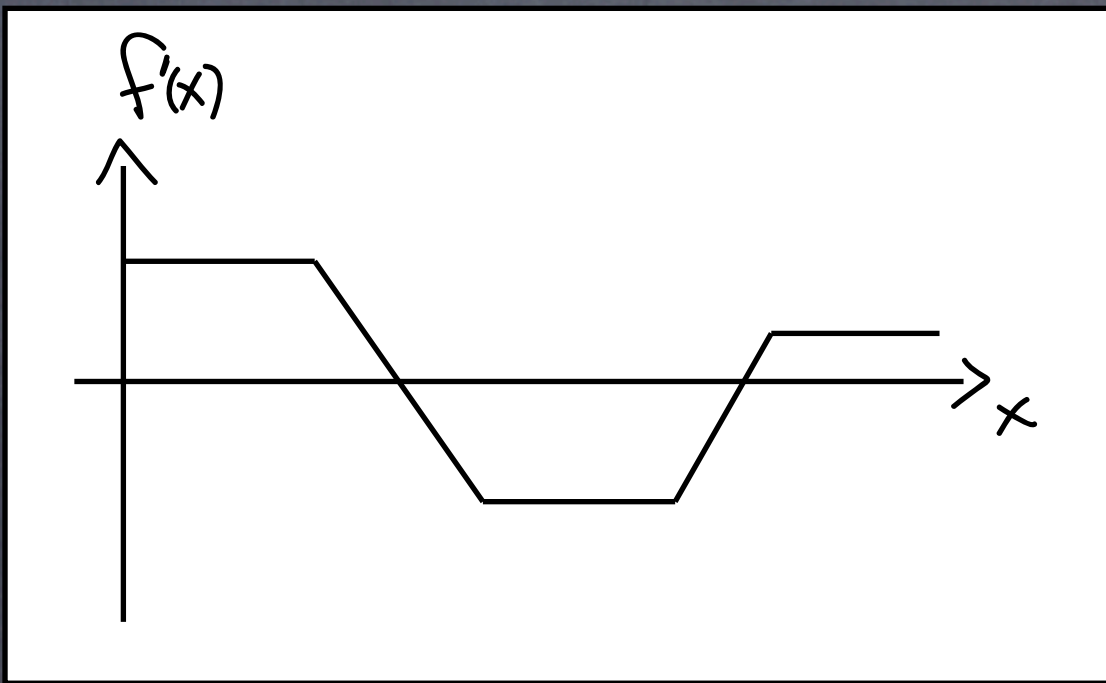


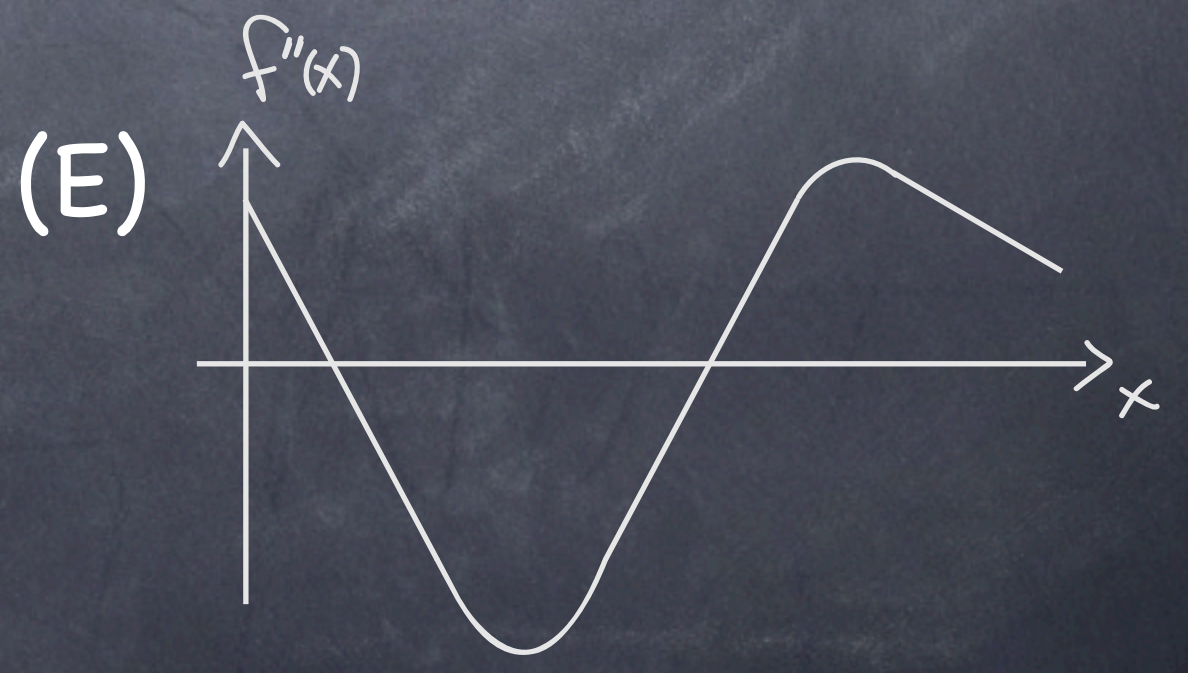
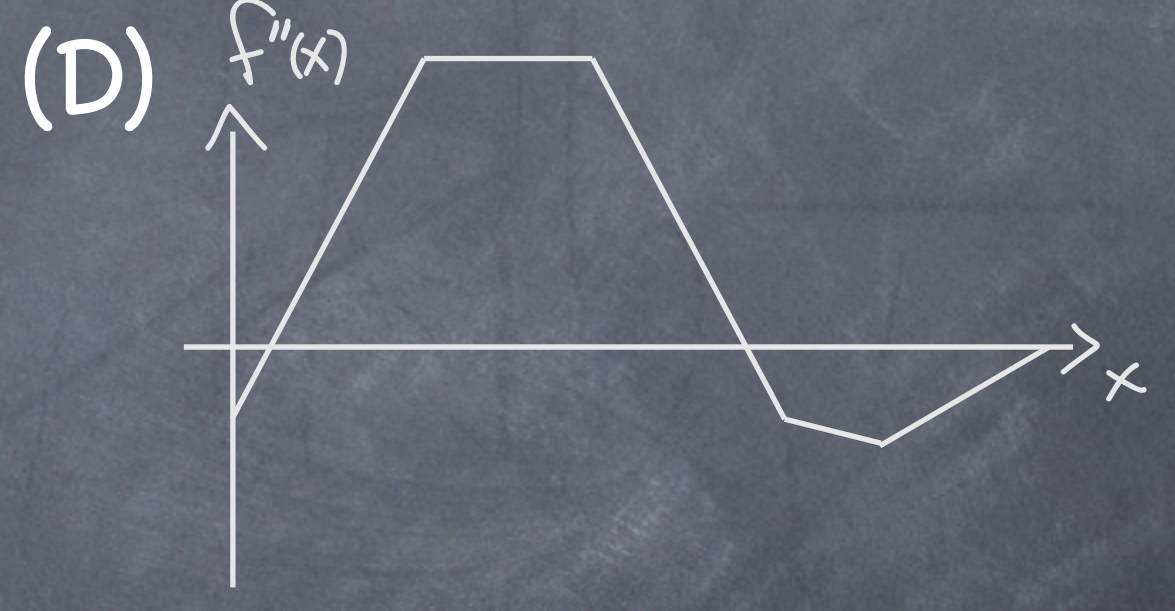
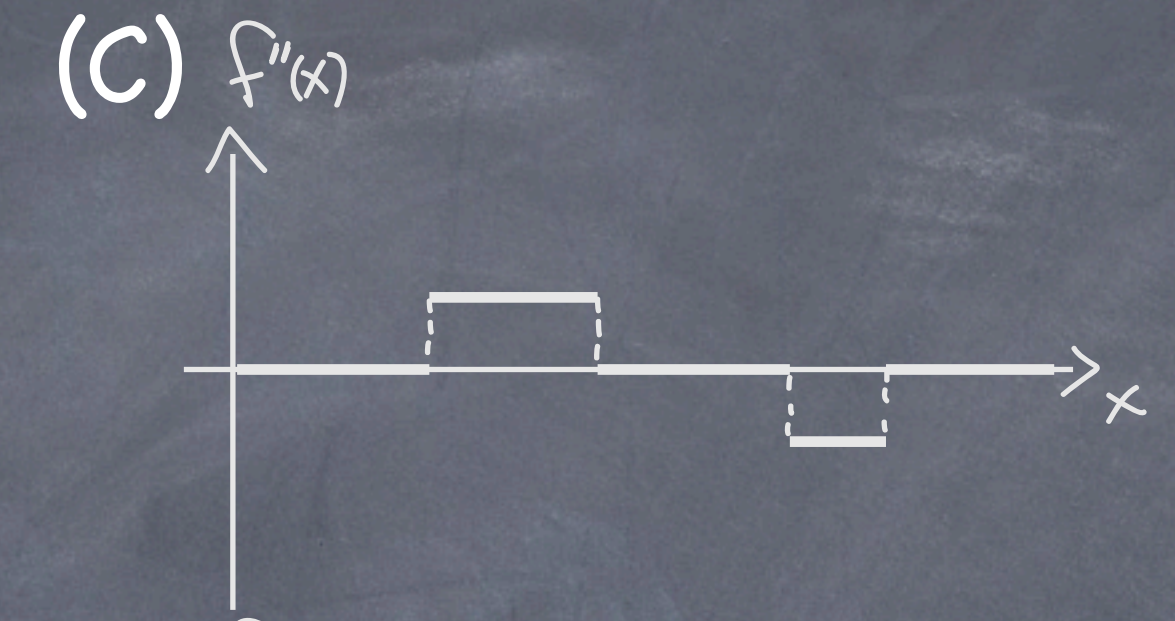
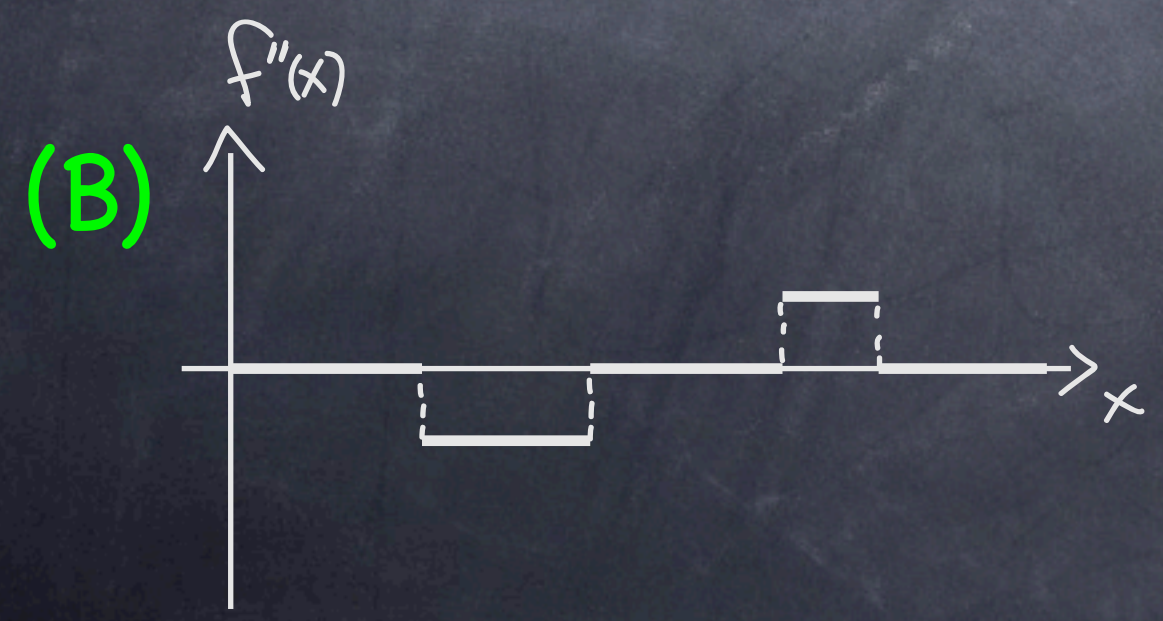
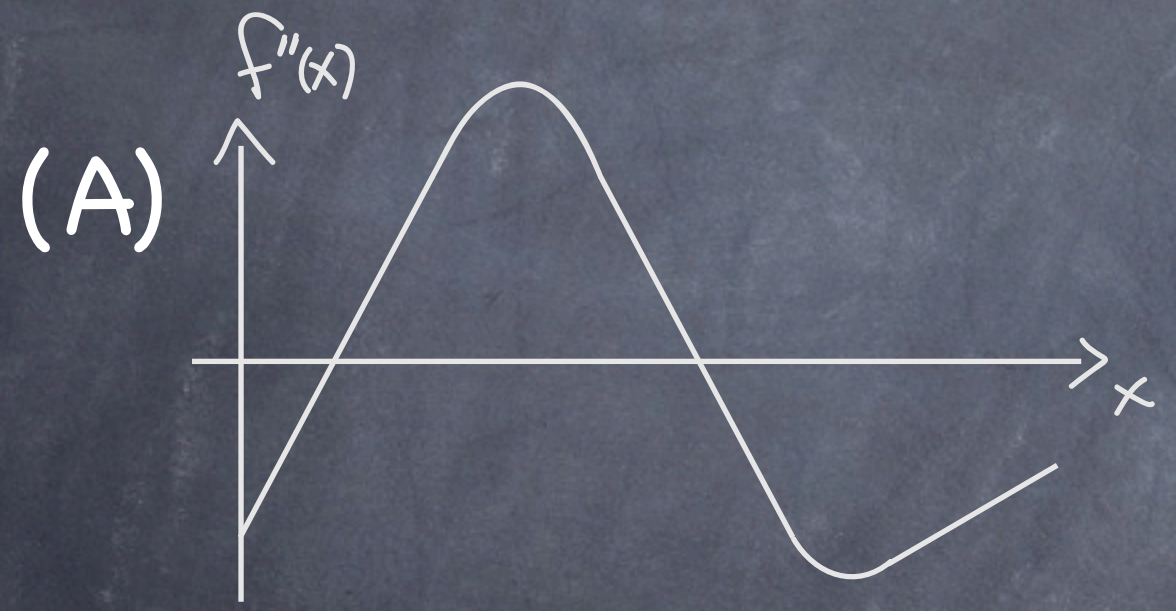
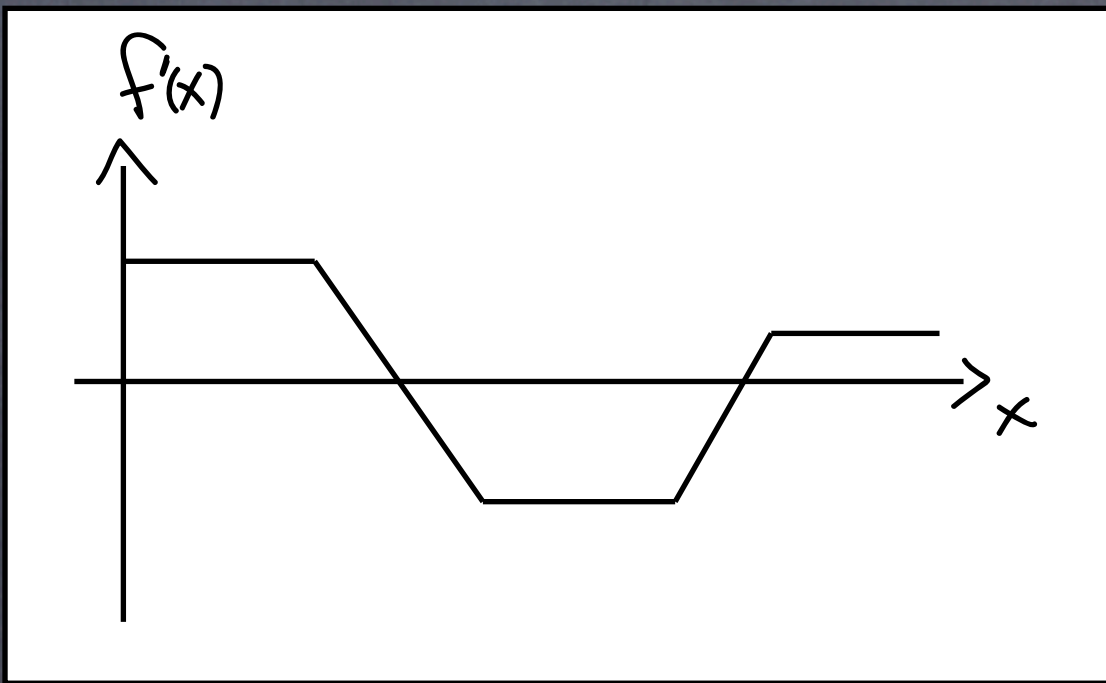
(D)



(E)







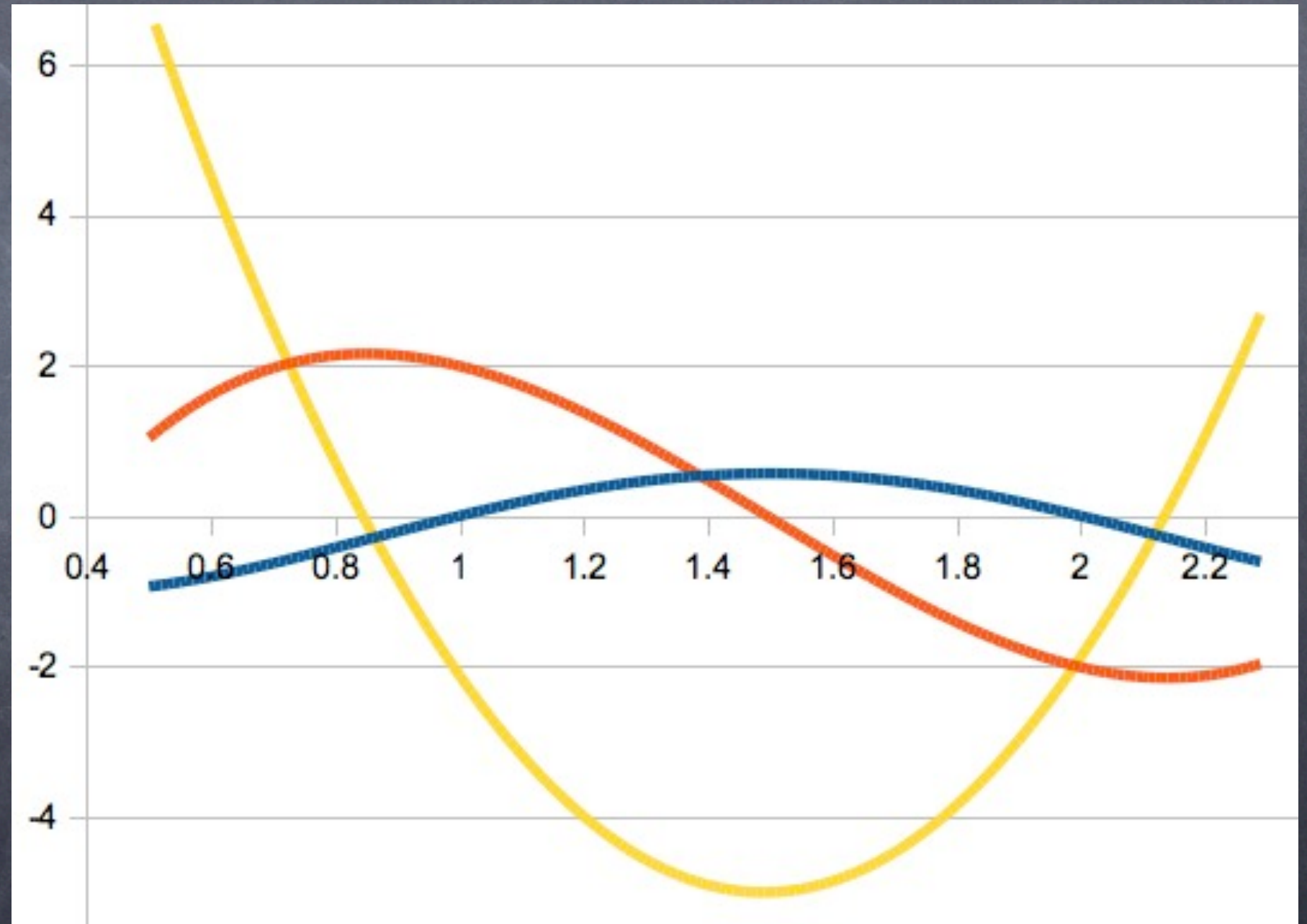
Which is x , v , a ?

(A) x , v , a

(B) x , v , a

(C) x , v , a

(D) x , v , a



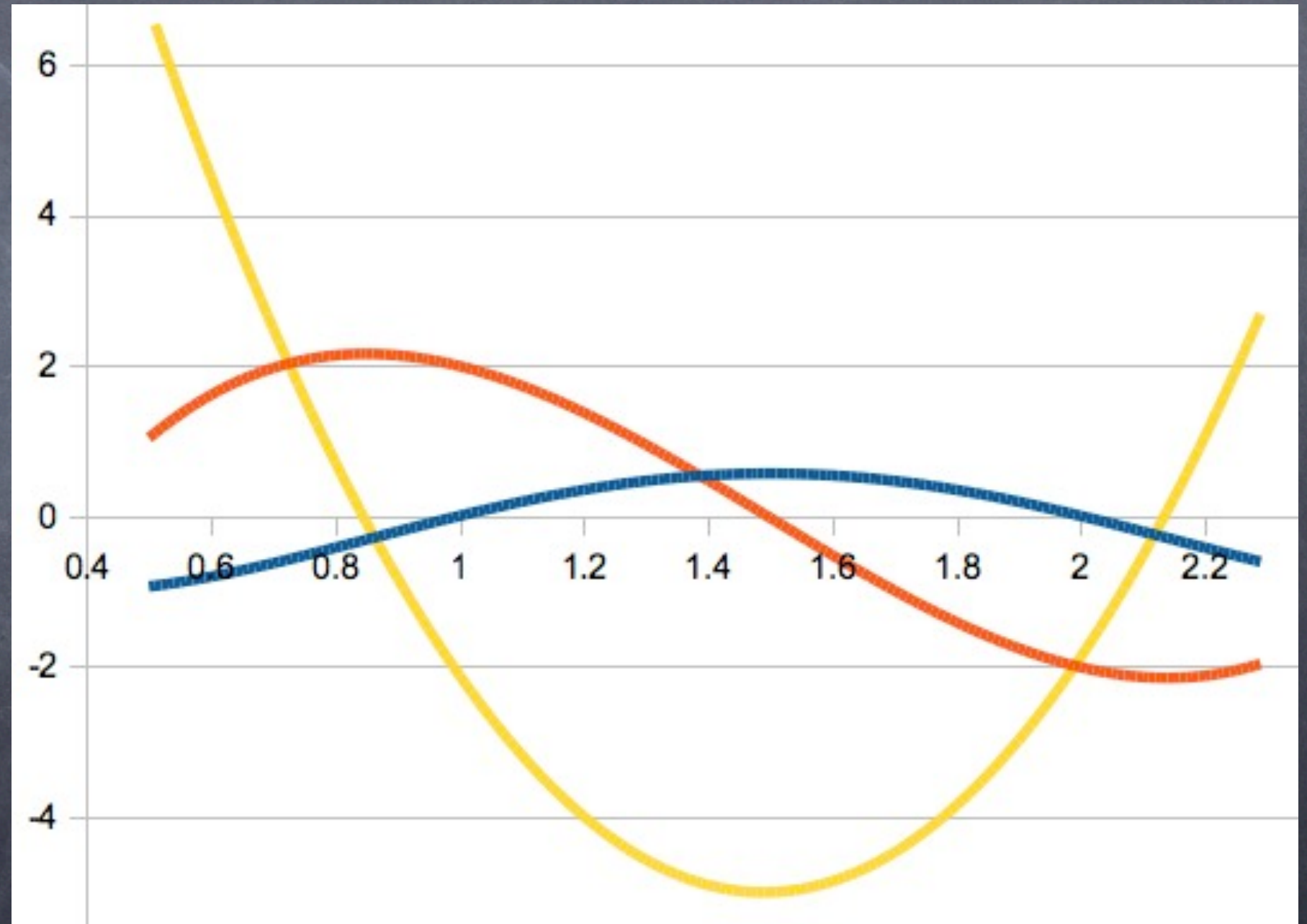
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Check max/mins \rightarrow zeros, check inc/dec \rightarrow +/-.

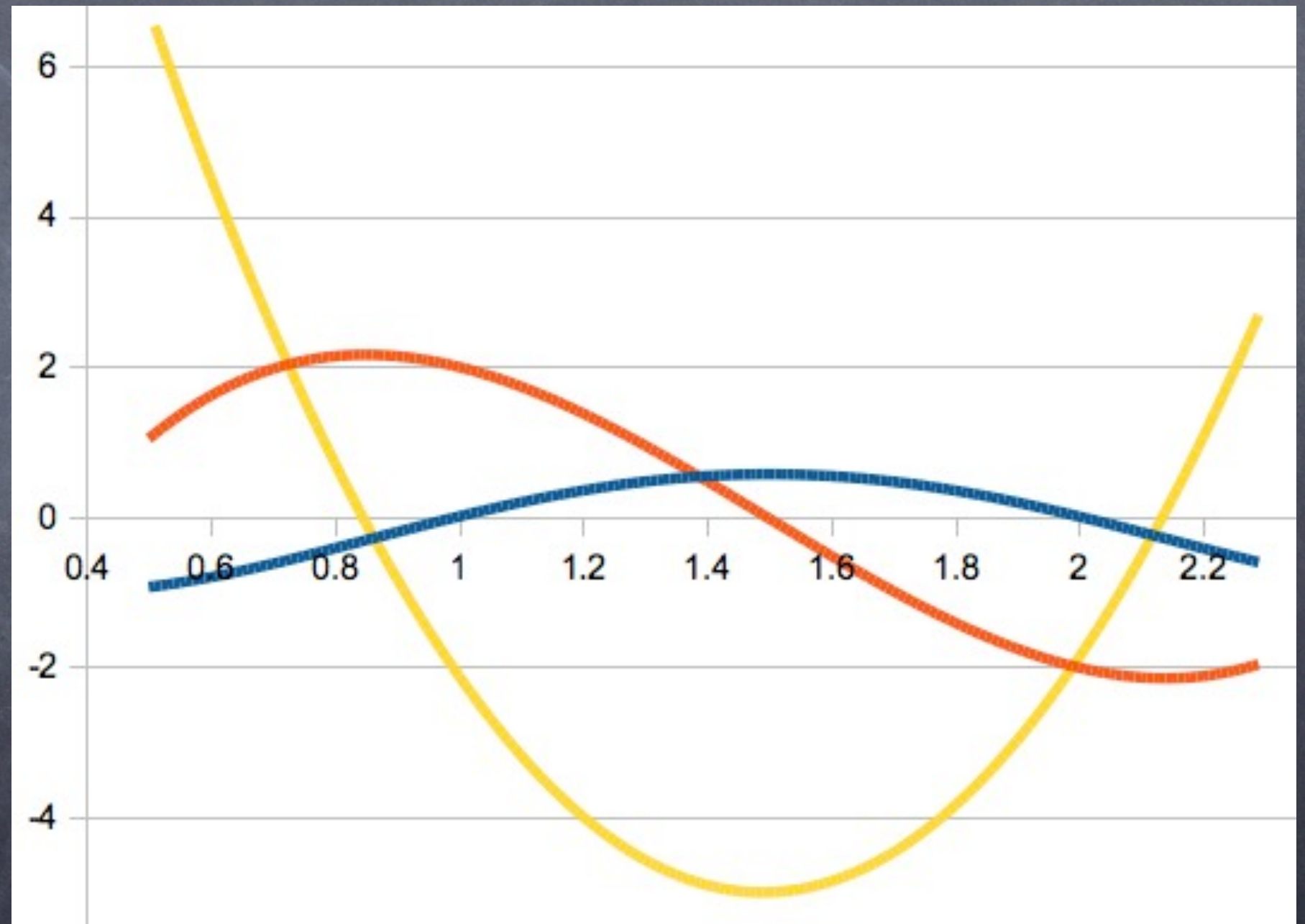
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