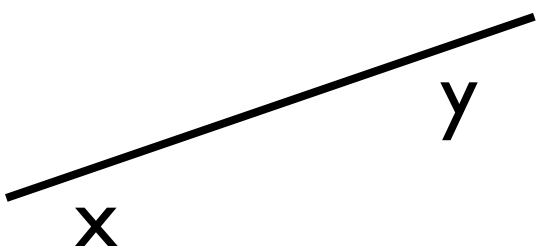
Graphing using derivatives

The function is flat.

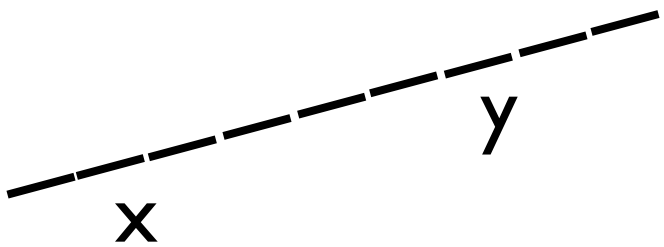
$$\Rightarrow f(y) = f(x)$$
$$\Rightarrow f(y) - f(x) = 0$$
$$\Rightarrow f'(y) = \lim_{x \to y} \frac{f(y) - f(x)}{y - x} = 0$$



The function is increasing.

$$\Rightarrow f(y) > f(x)$$
$$\Rightarrow f(y) - f(x) > 0$$
$$\Rightarrow f'(y) = \lim_{x \to y} \frac{f(y) - f(x)}{y - x} \geq 0$$

Graphing using derivatives



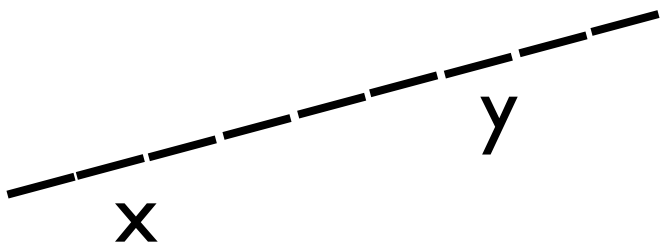
The slope is always the same.

$$\Rightarrow f'(y) = f'(x)$$

$$\Rightarrow f'(y) - f'(x) = 0$$

$$\Rightarrow f''(y) = \lim_{x \to y} \frac{f'(y) - f'(x)}{y - x} = 0$$

Graphing using derivatives



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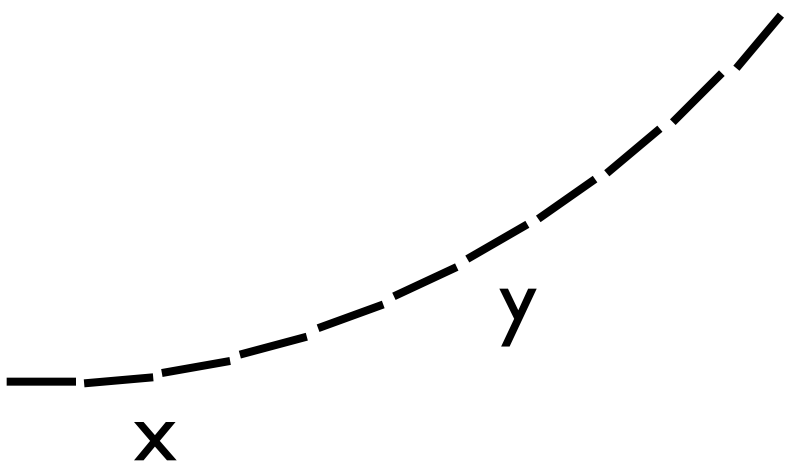
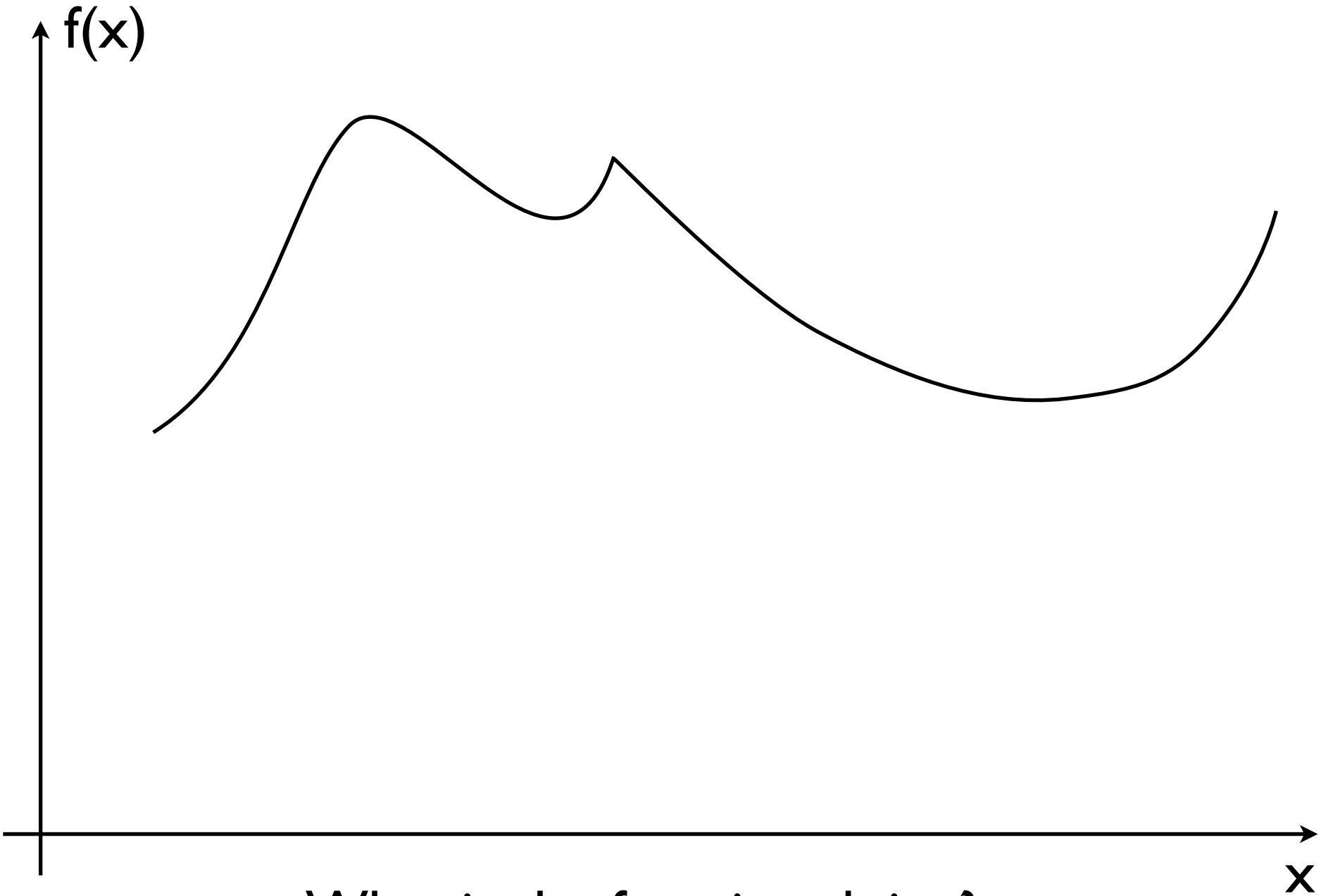


The slope is increasing.

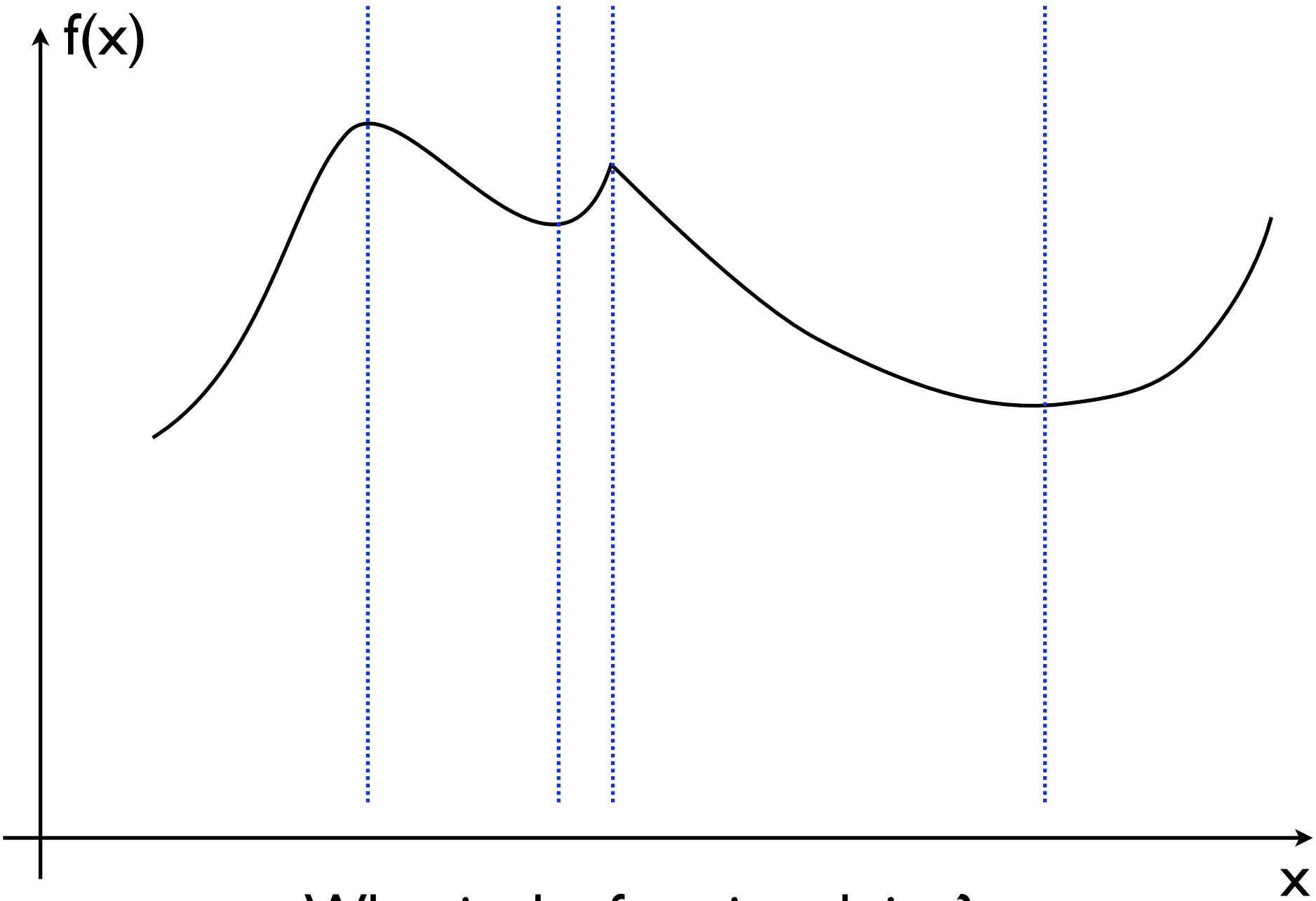
$$\Rightarrow f'(y) > f'(x)$$
$$\Rightarrow f'(y) - f'(x) > 0$$
$$\Rightarrow f''(y) = \lim_{x \to y} \frac{f'(y) - f'(x)}{y - x} \geq 0$$

The first derivative



What is the function doing?

The first derivative



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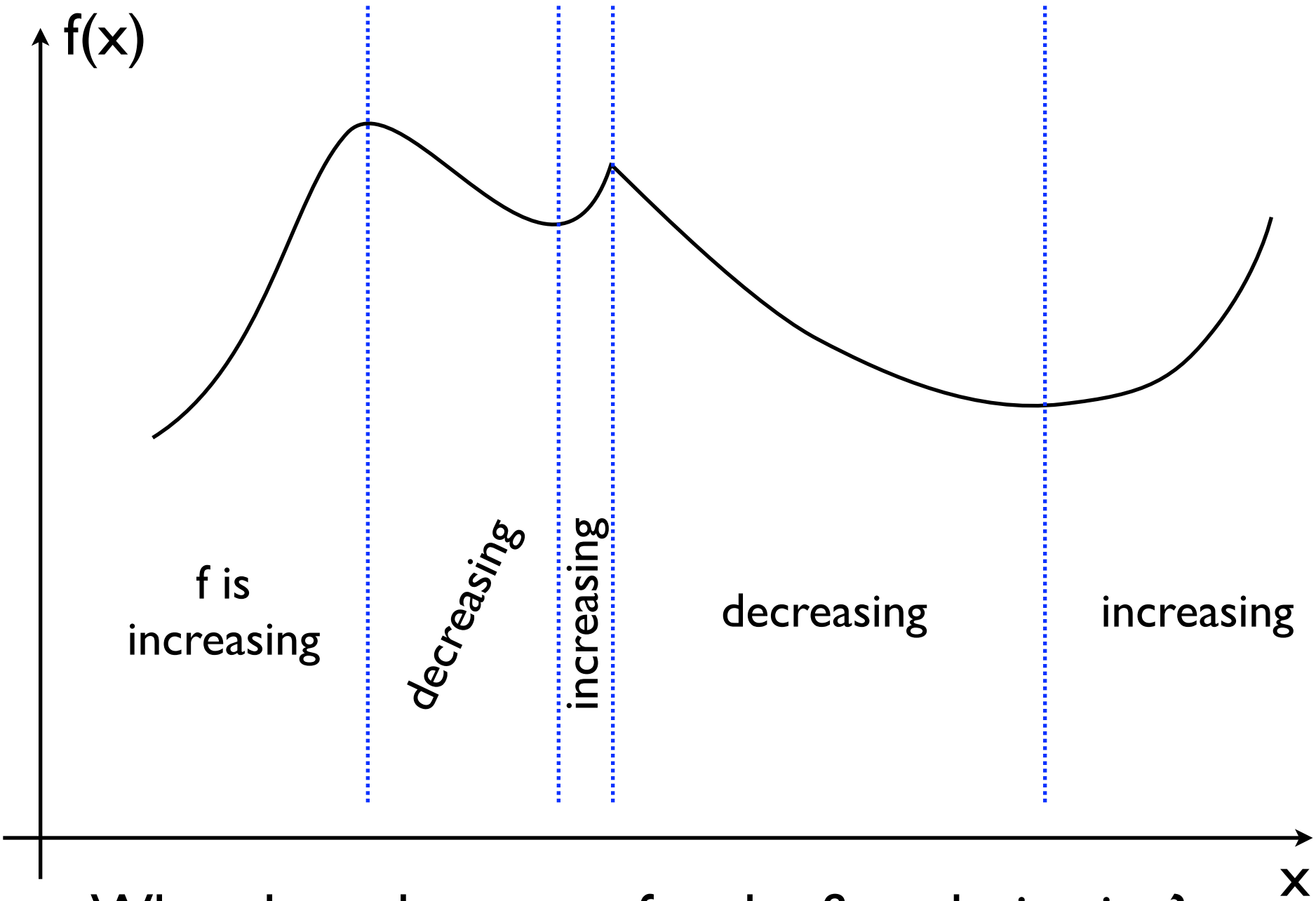
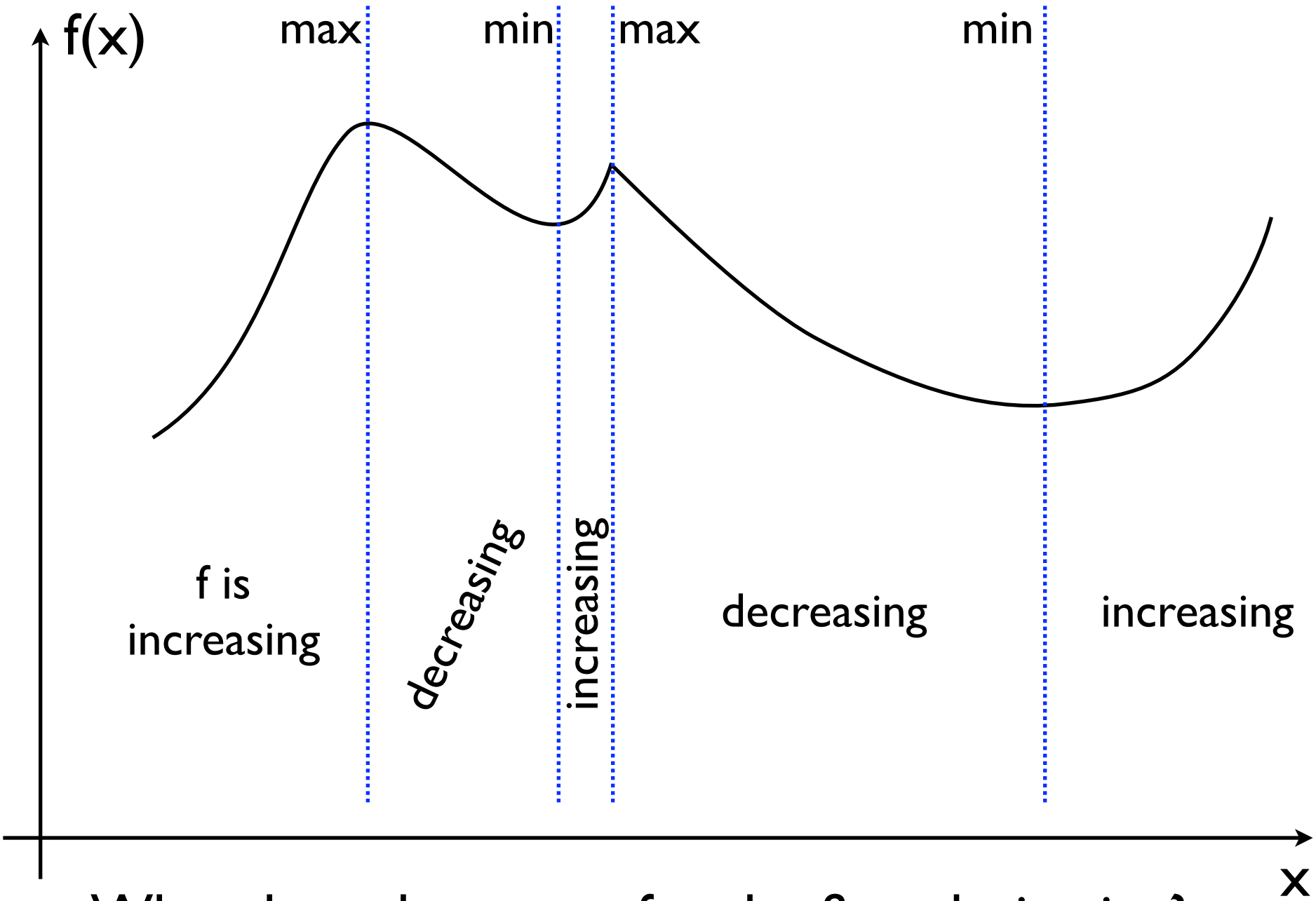


What does that mean for the first derivative?

The first derivative



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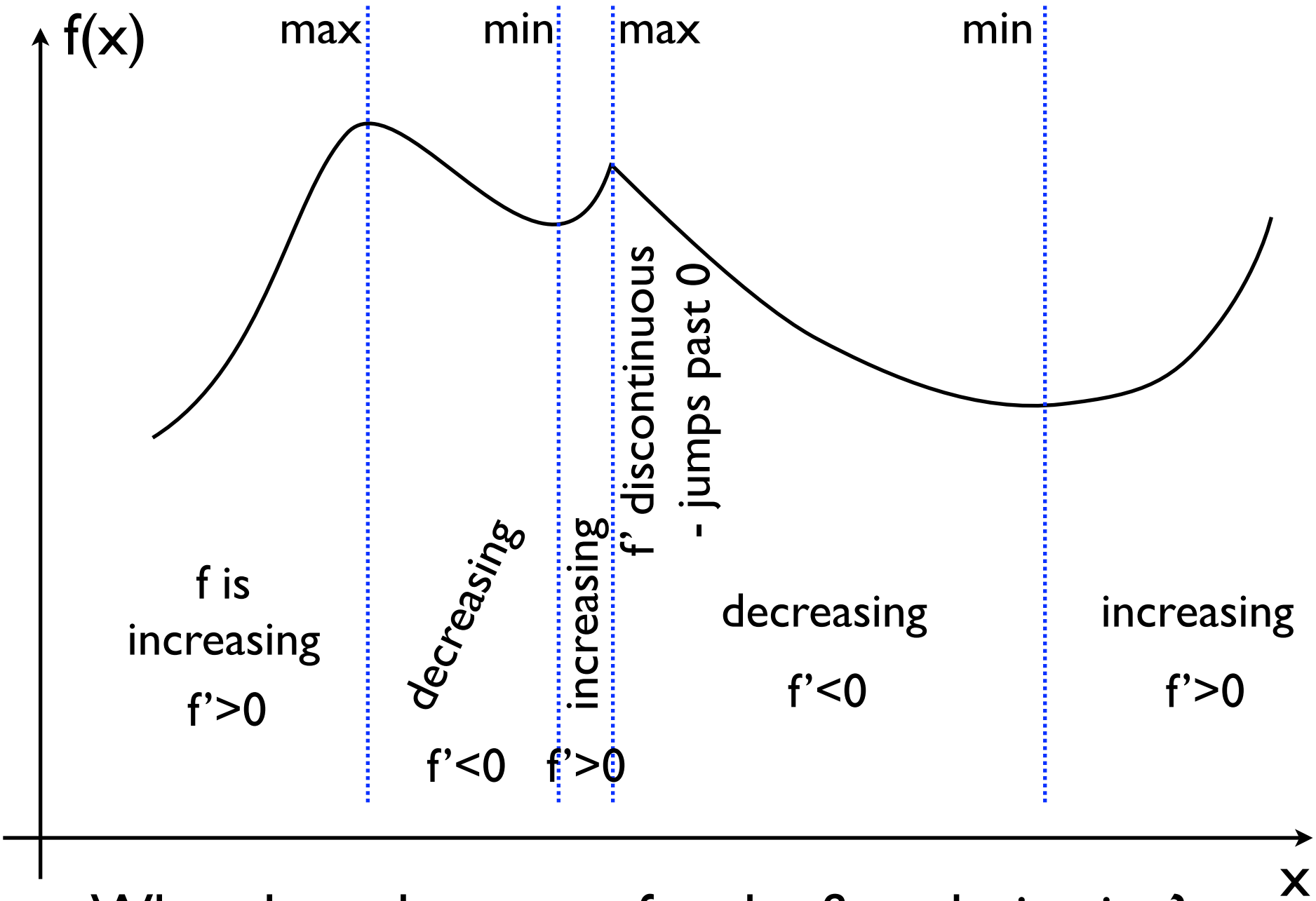

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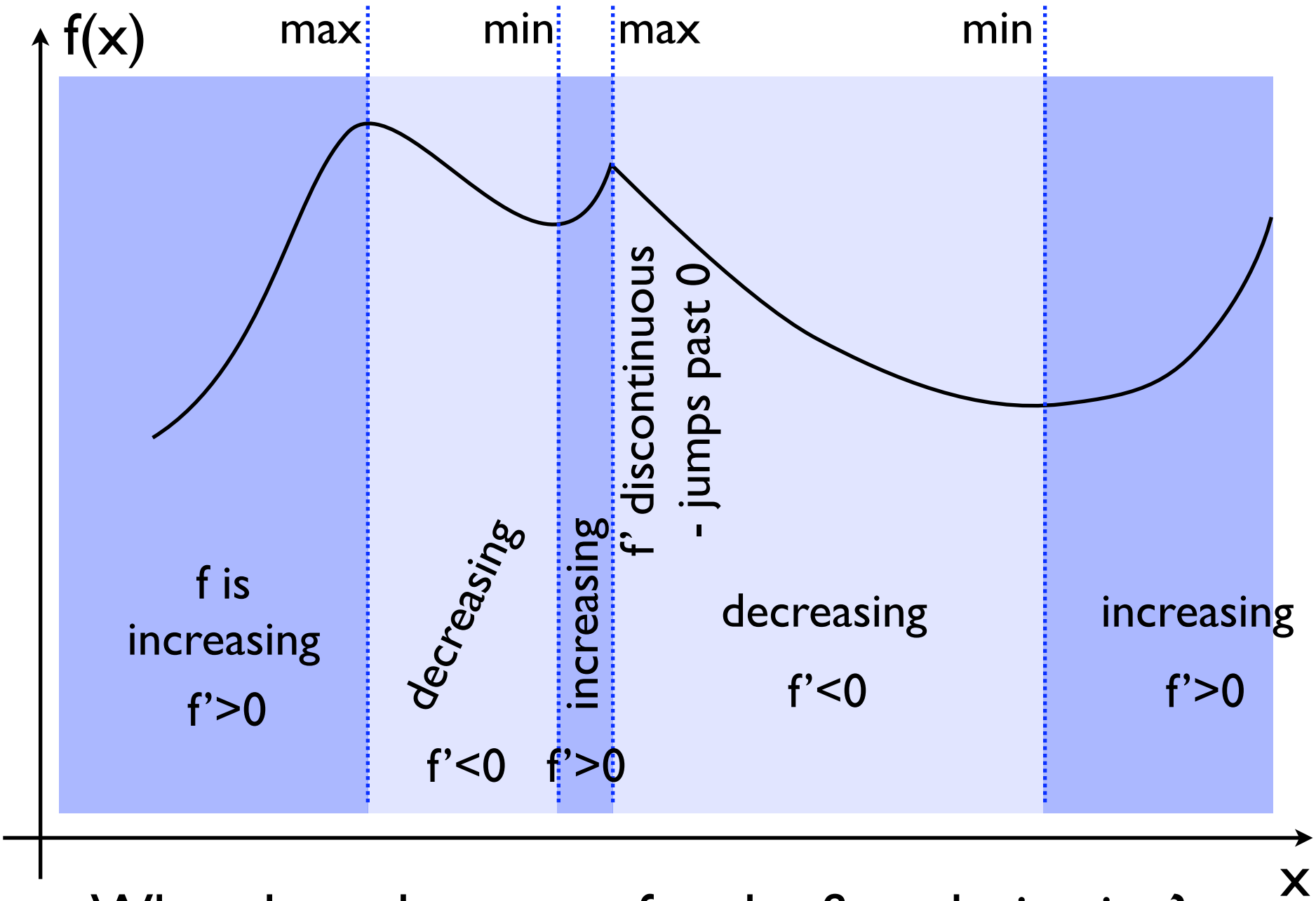
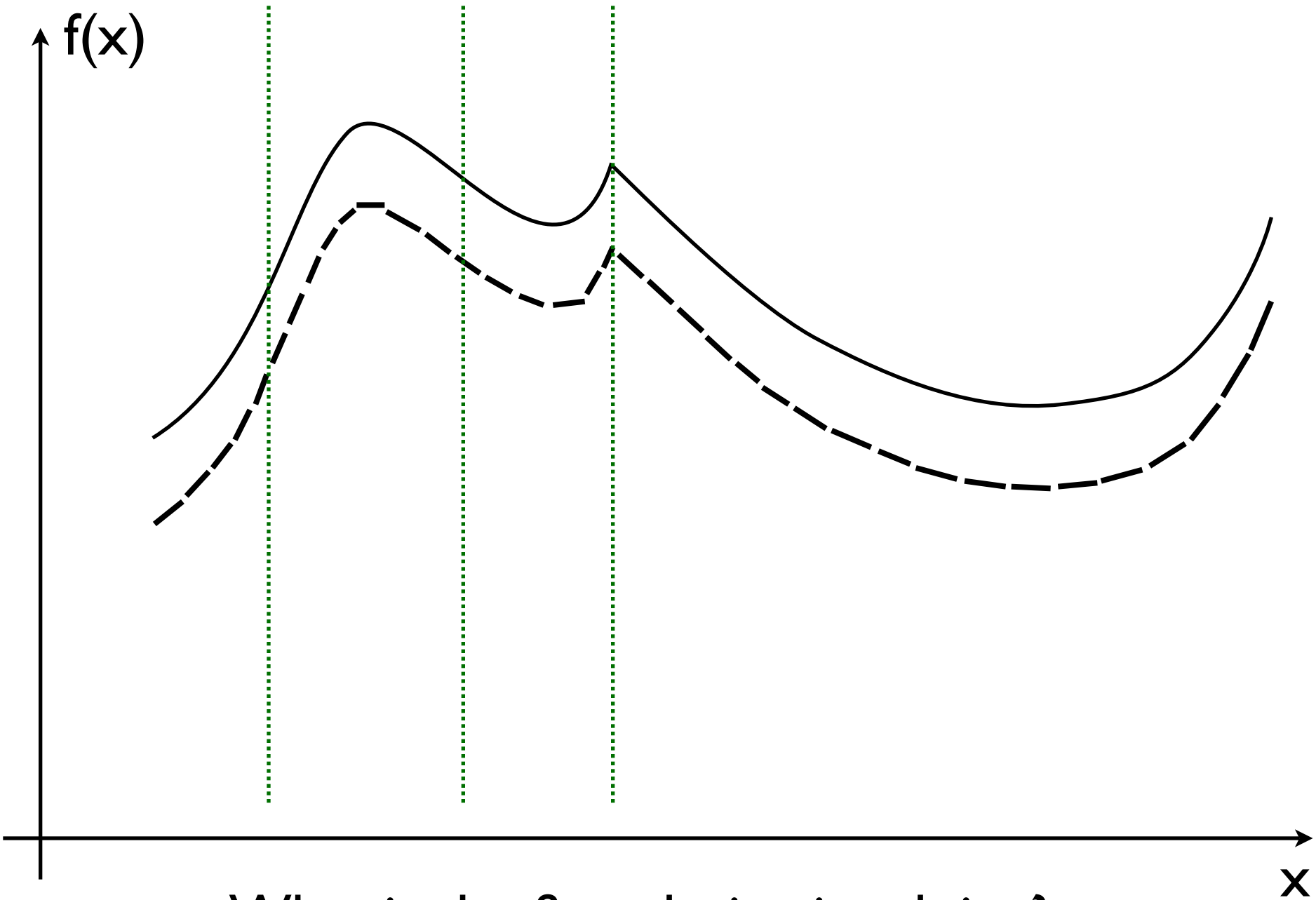


What does that mean for the first derivative?

The second derivative



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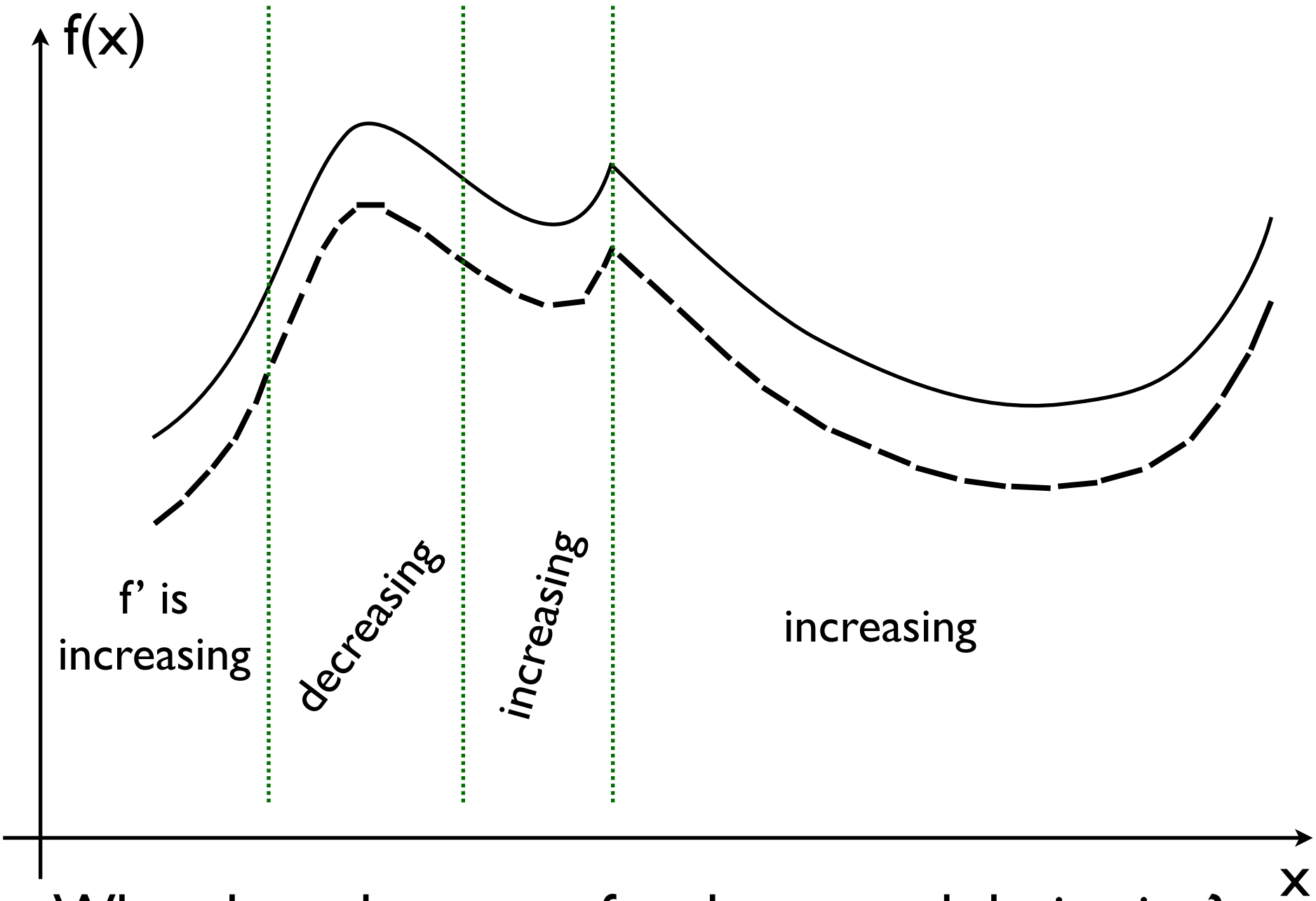

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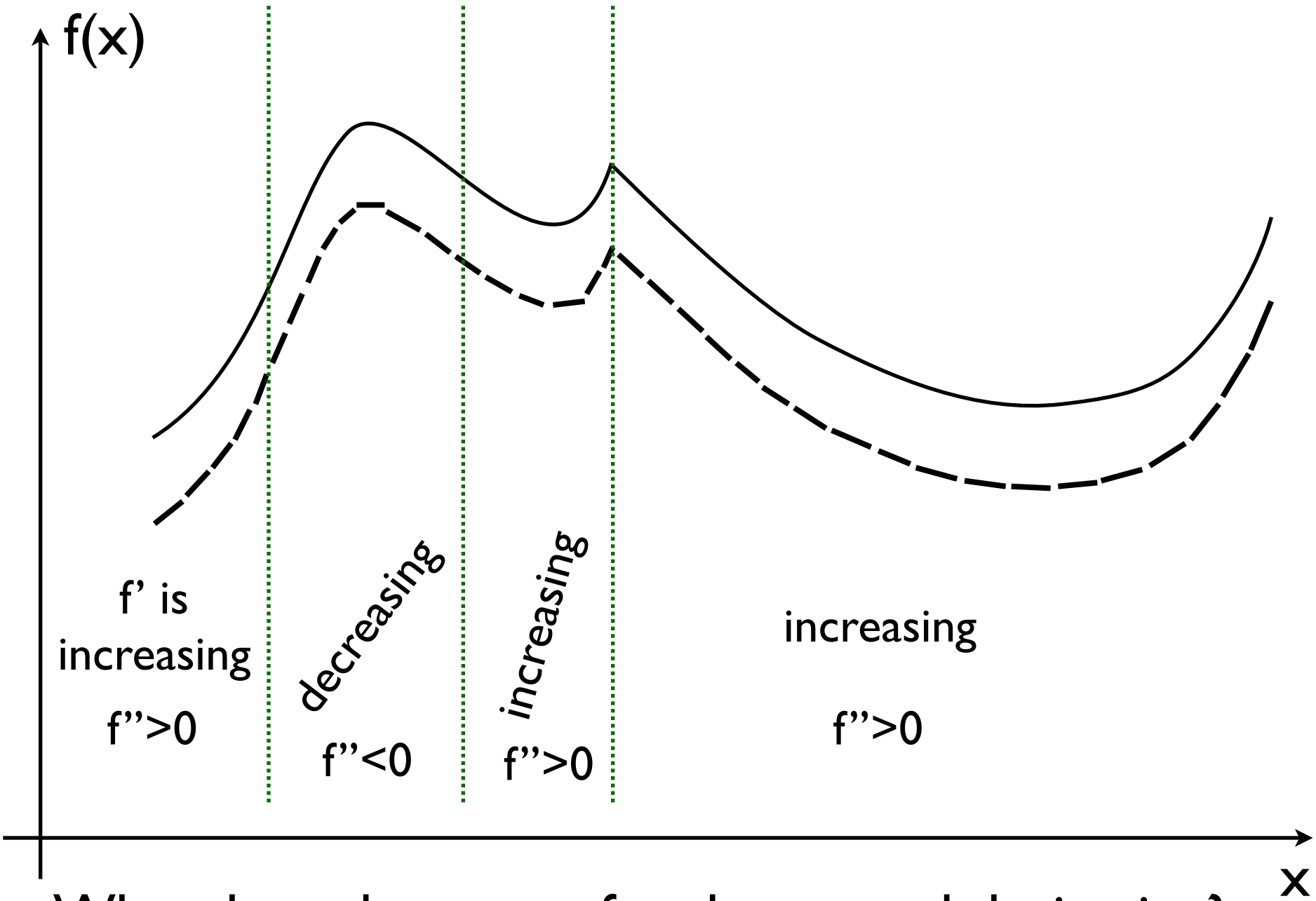
The second derivative



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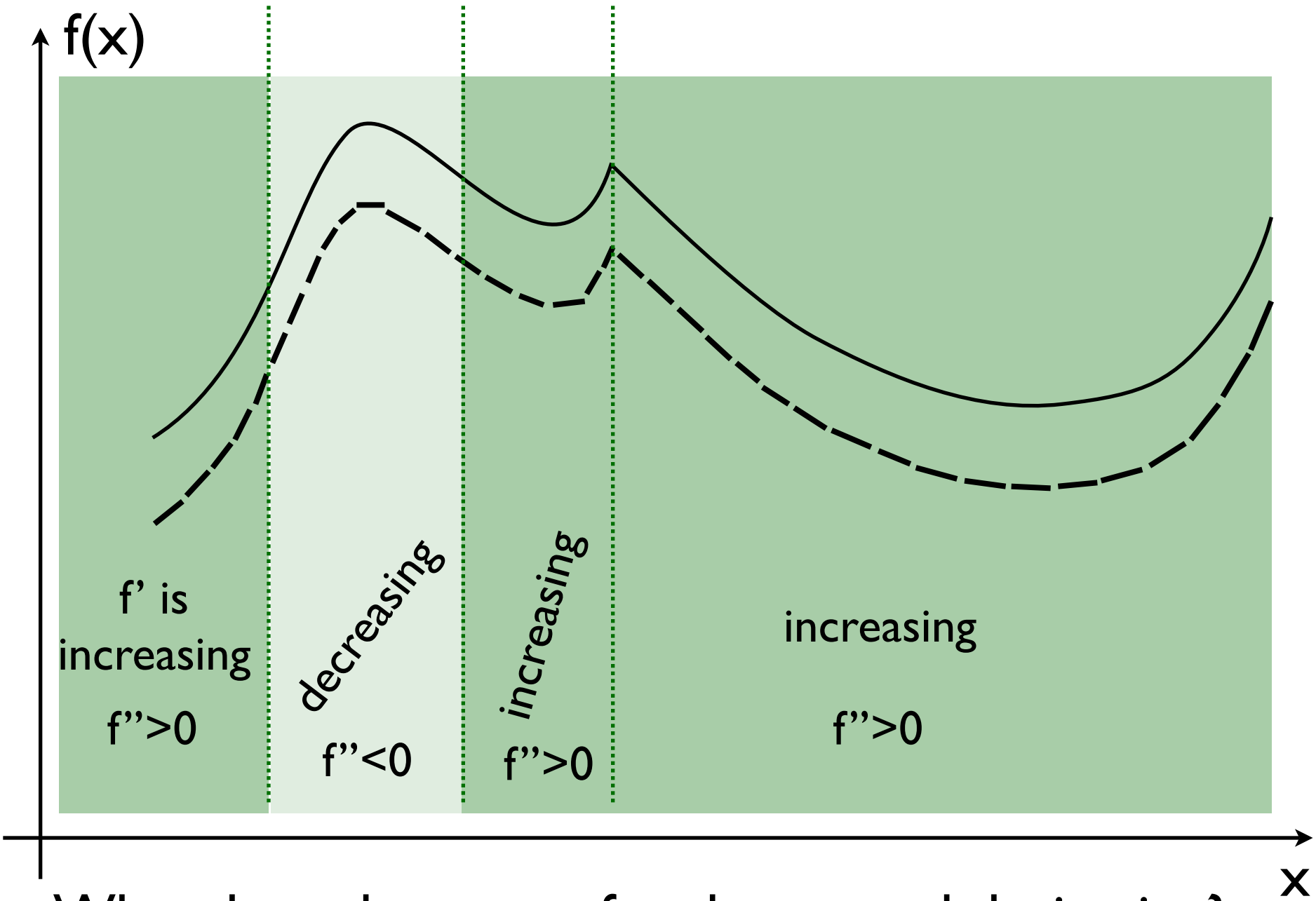
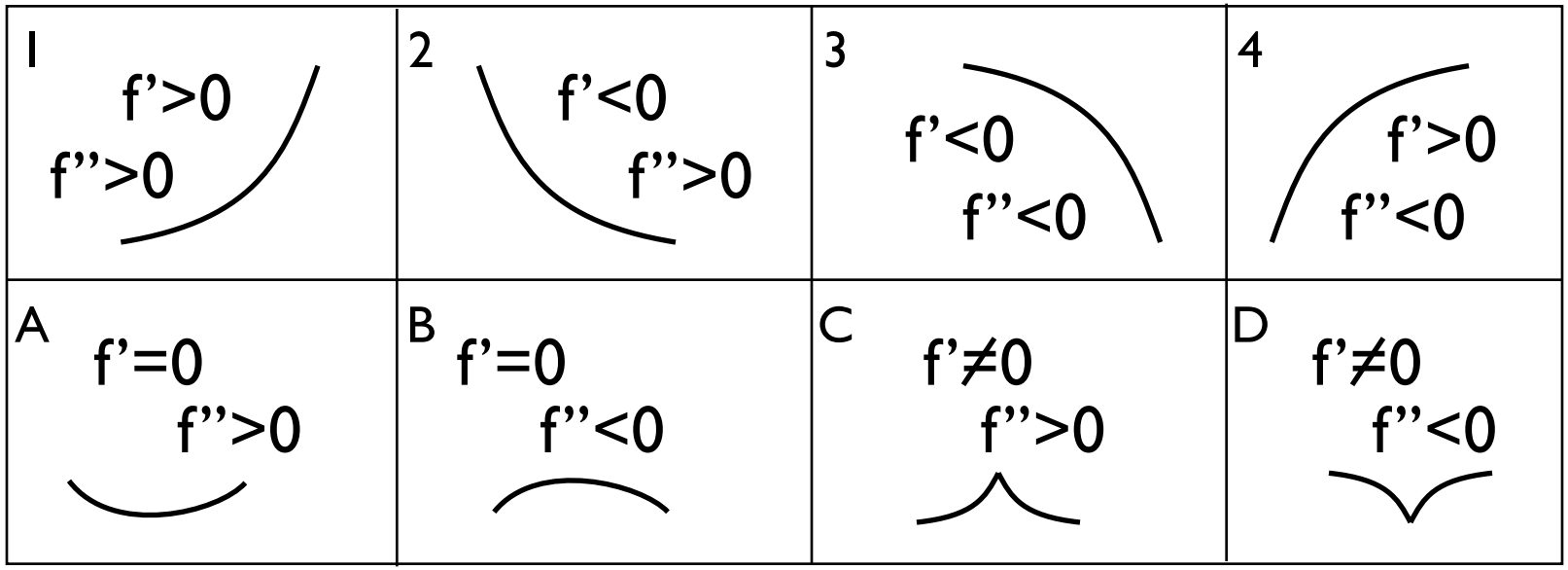


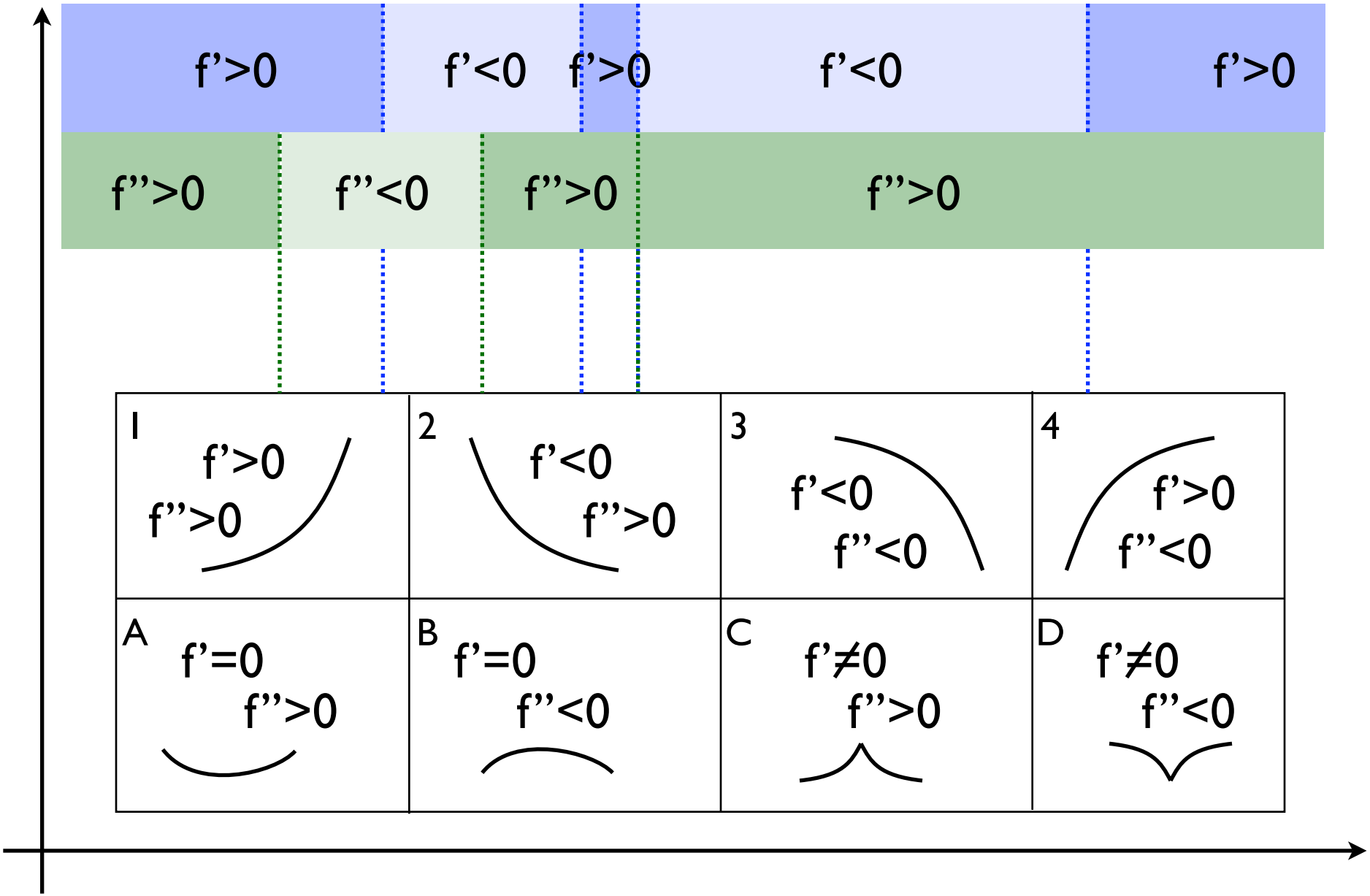
What does that mean for the second derivative?

Reconstructing the graph

The parts list:



Reconstructing the graph



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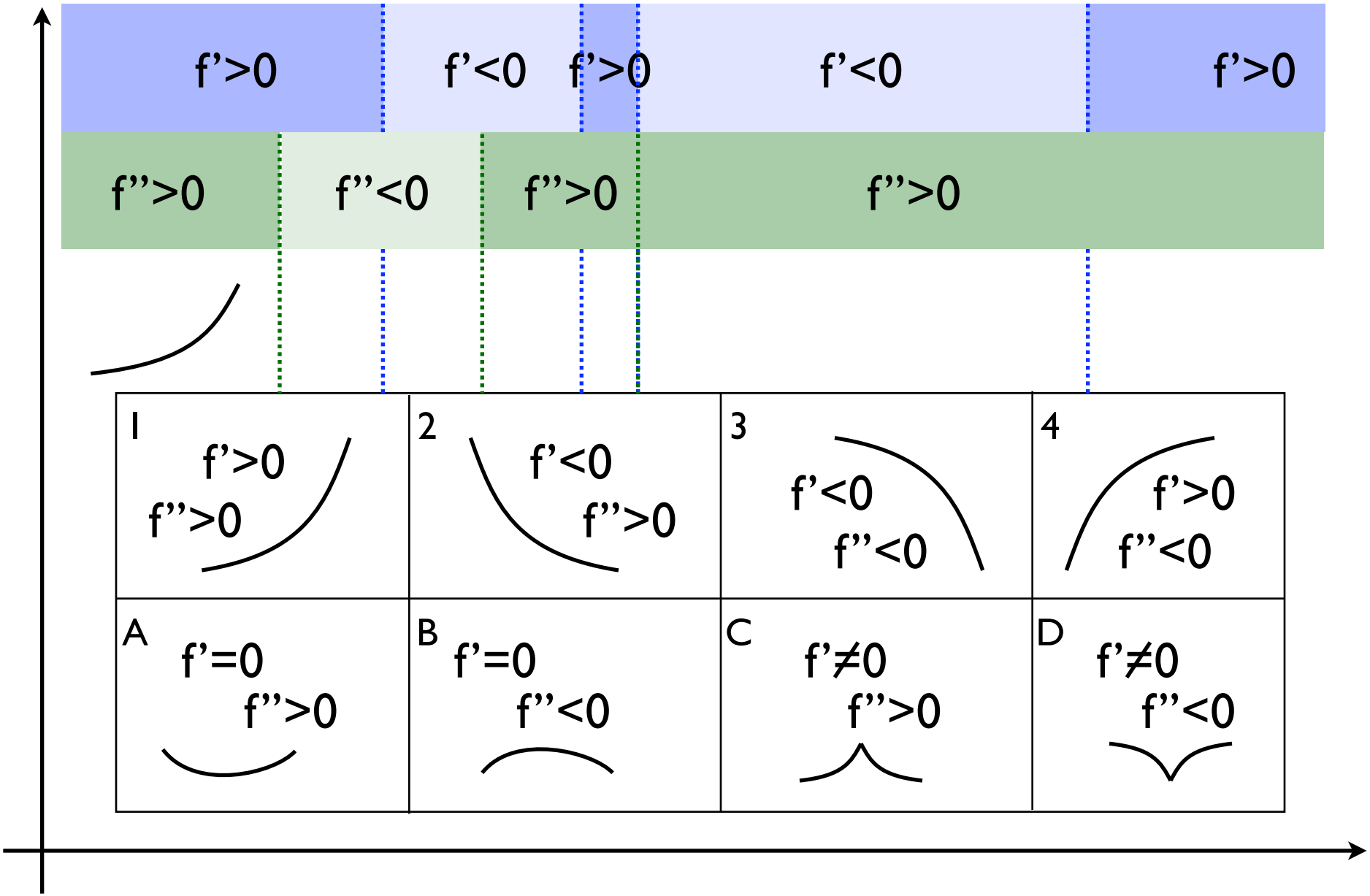

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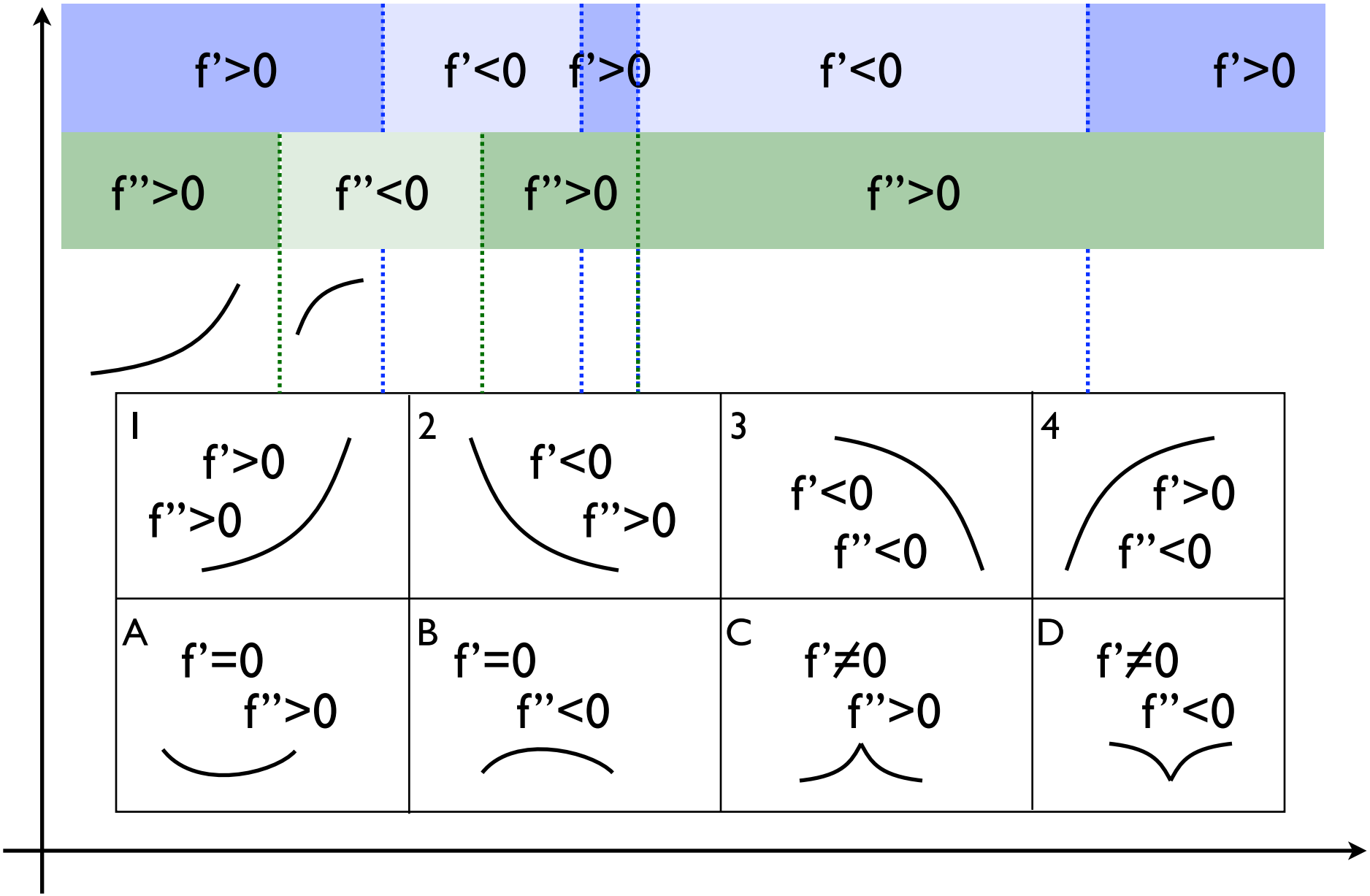
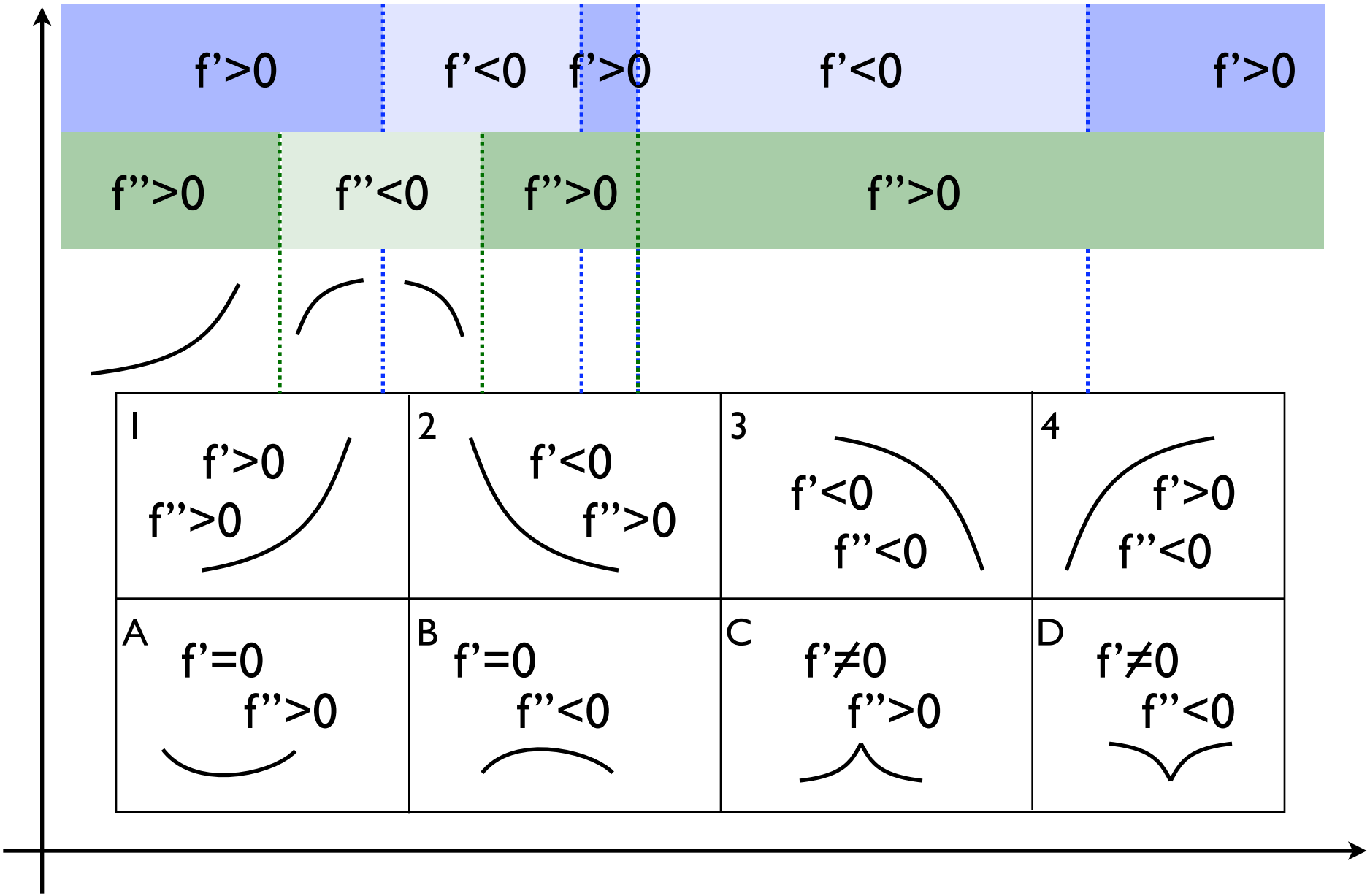


Reconstructing the graph



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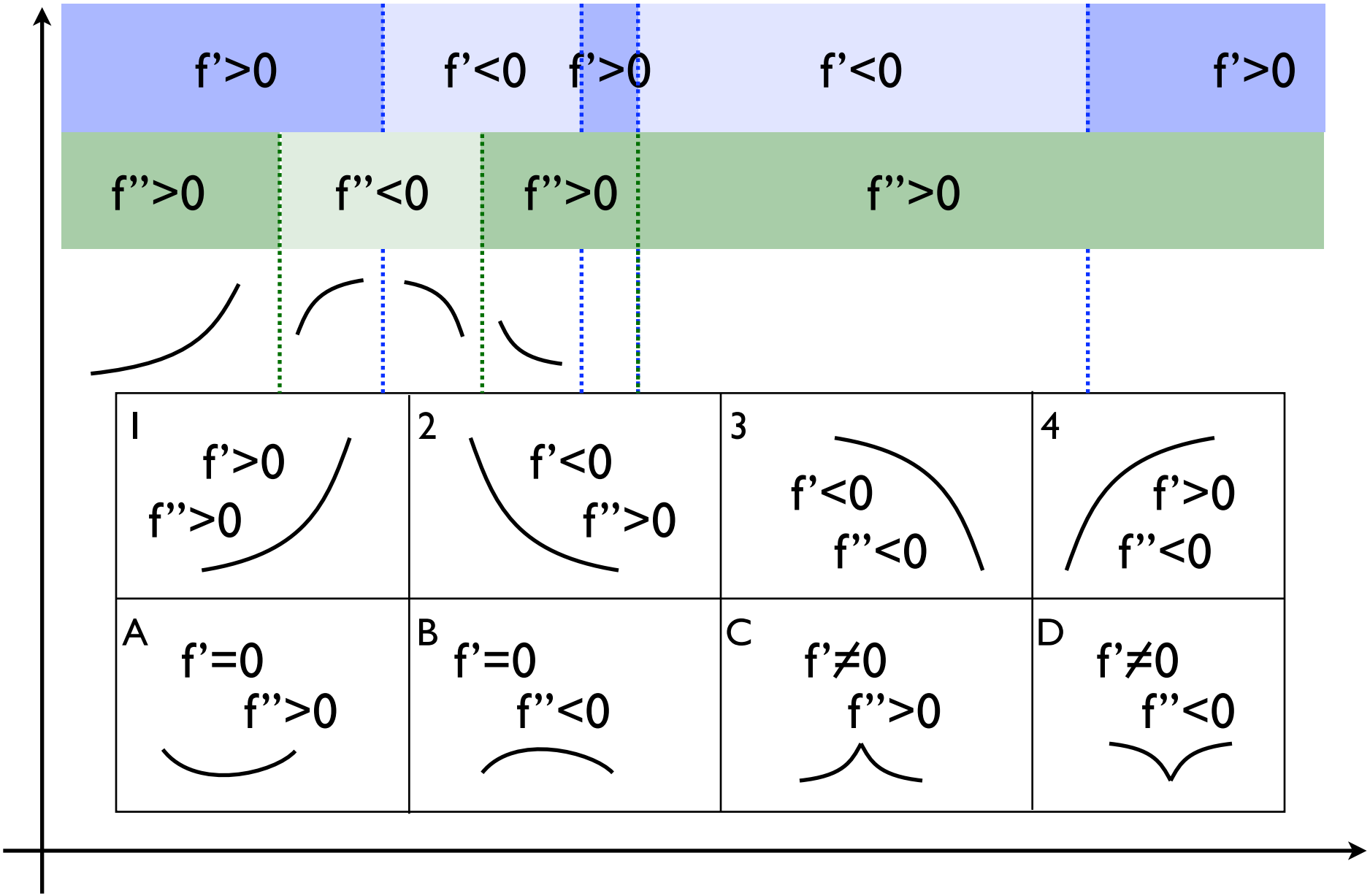

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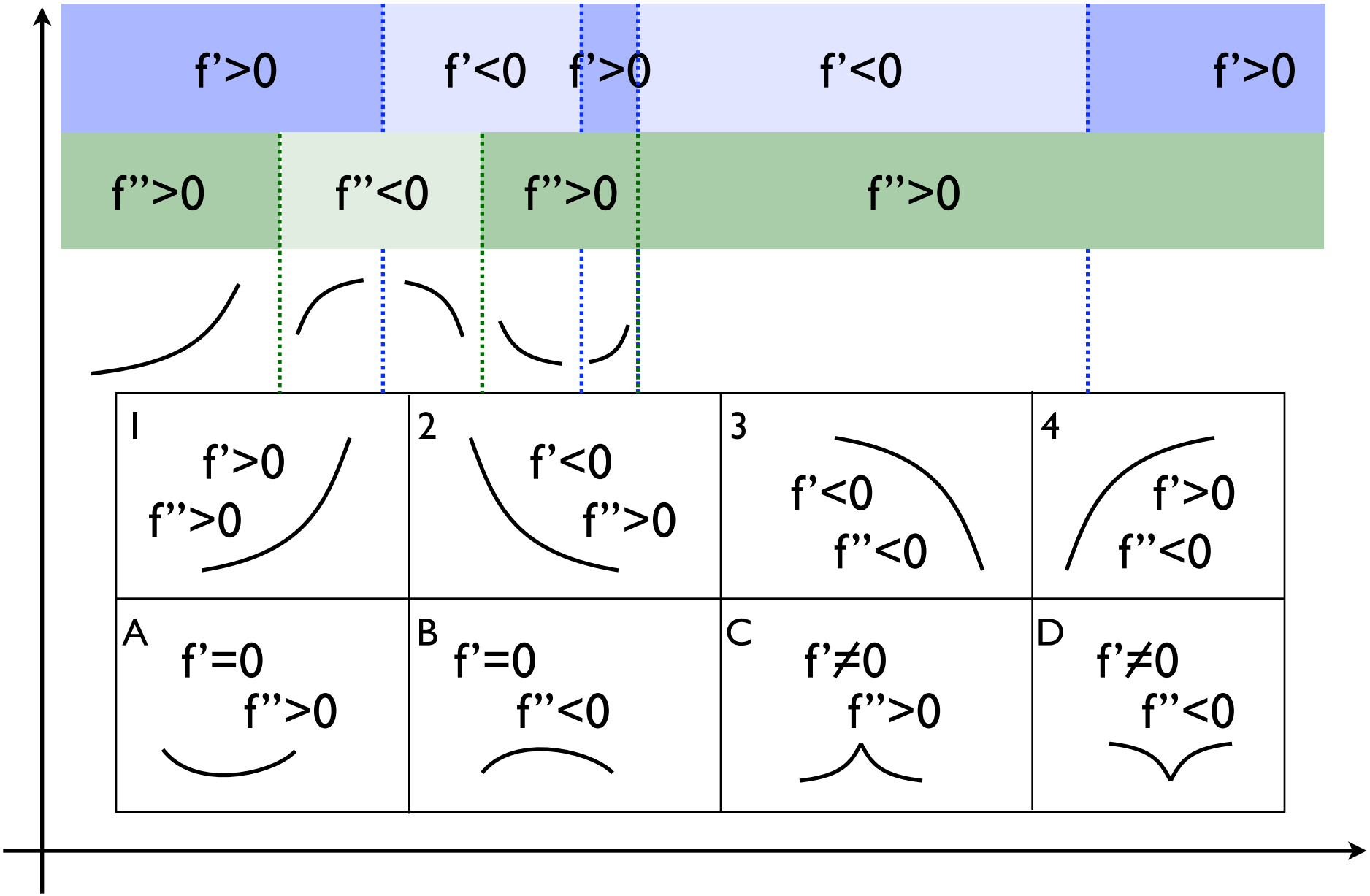

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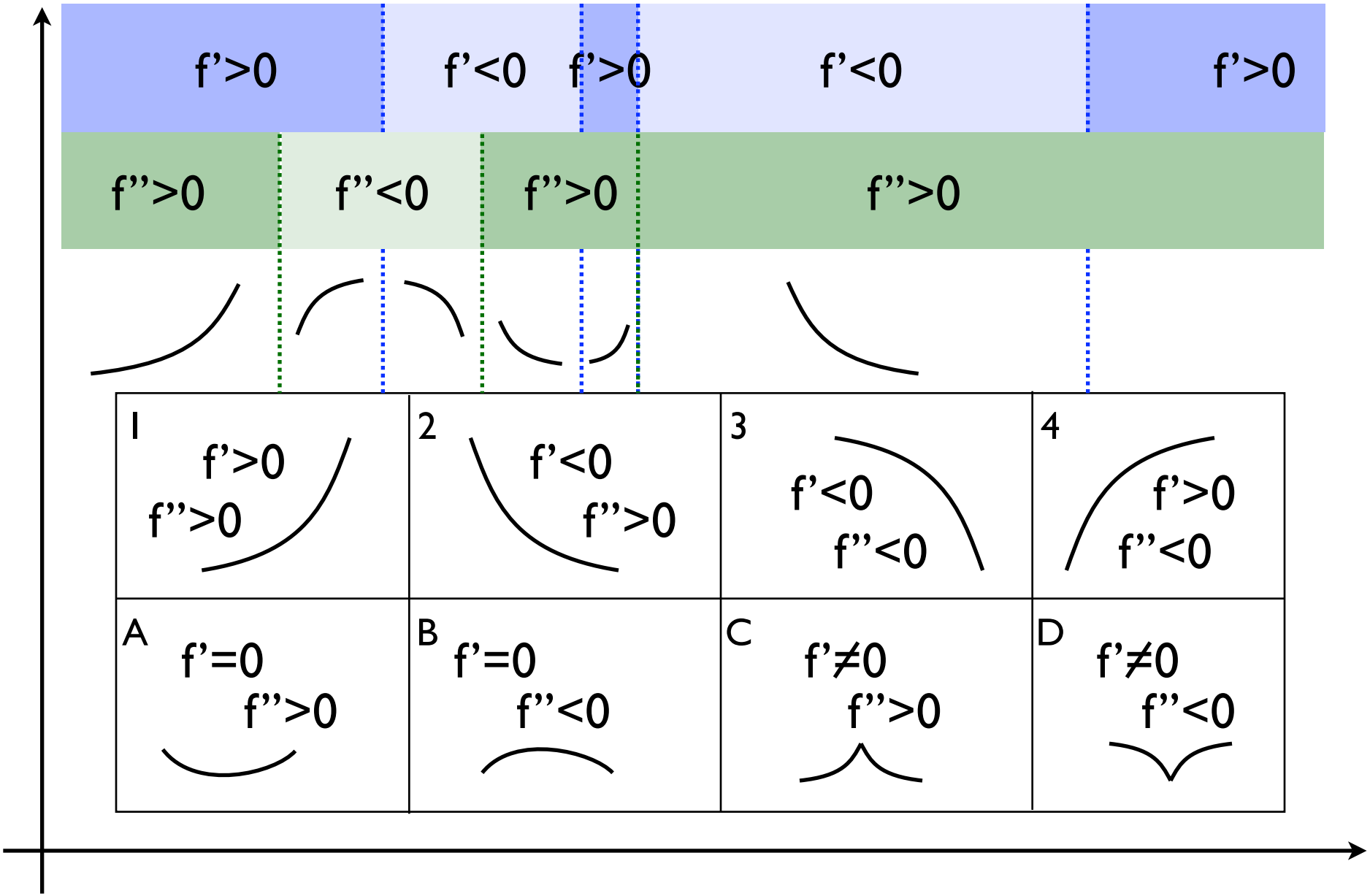

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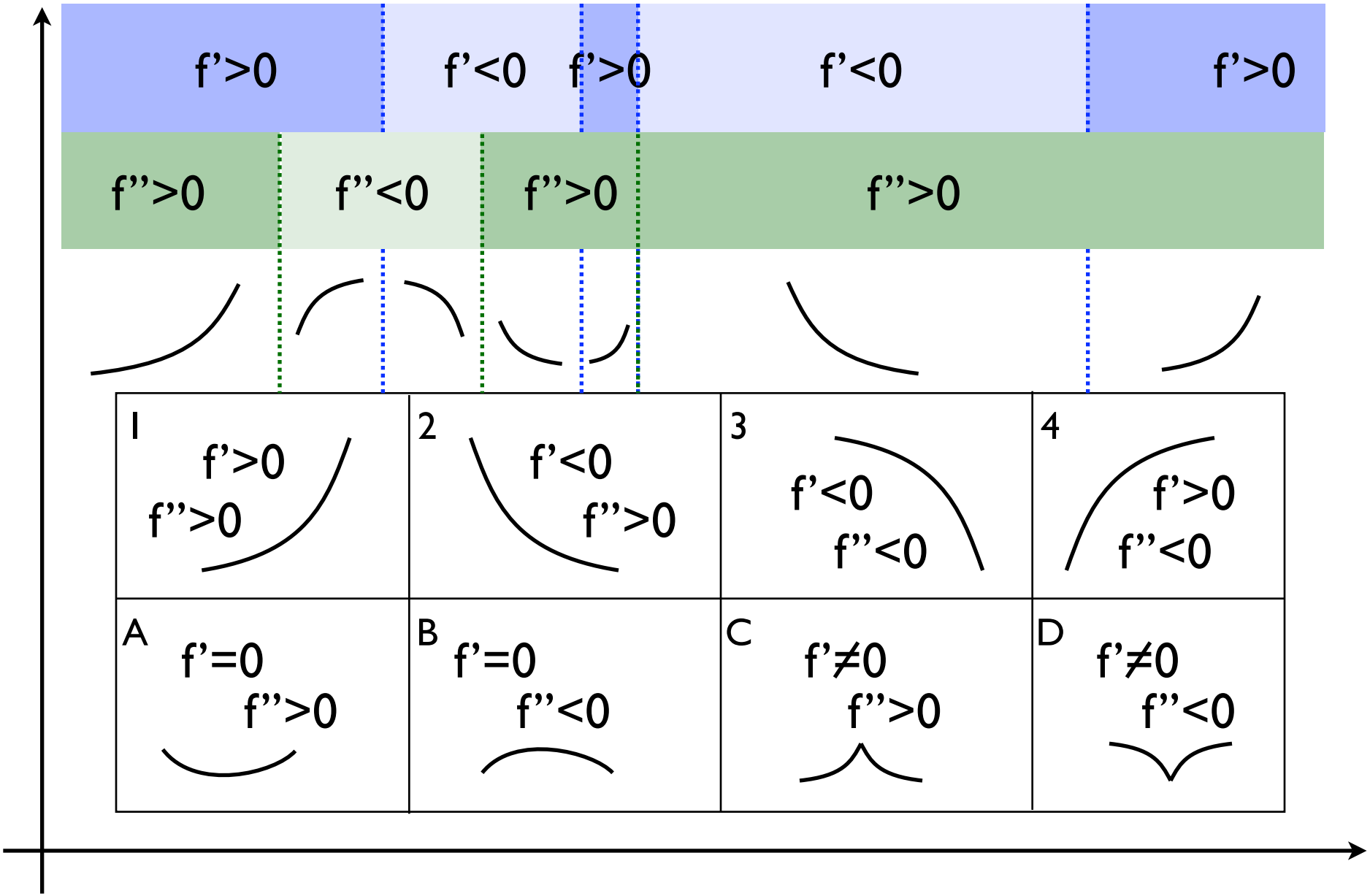

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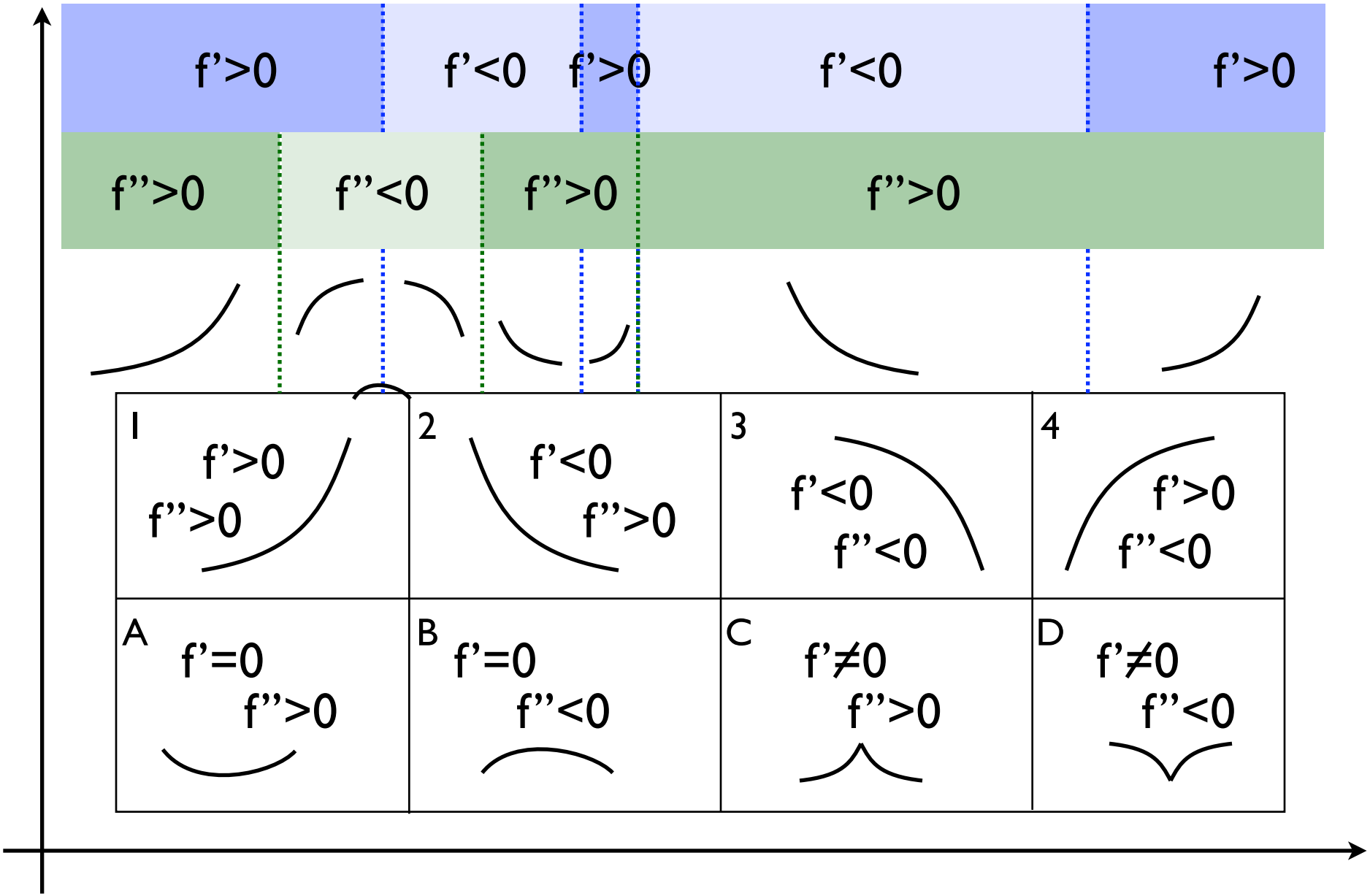

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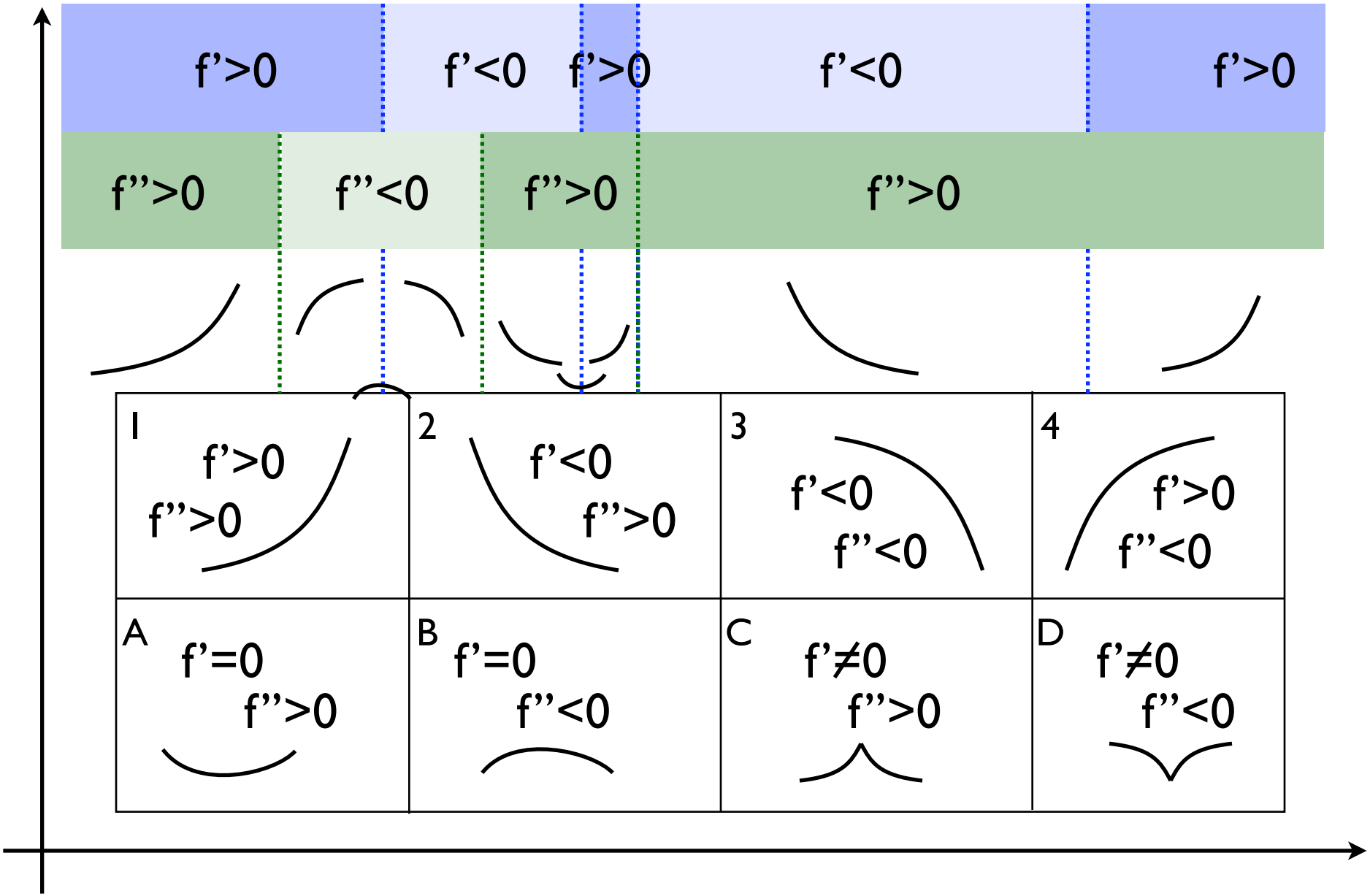

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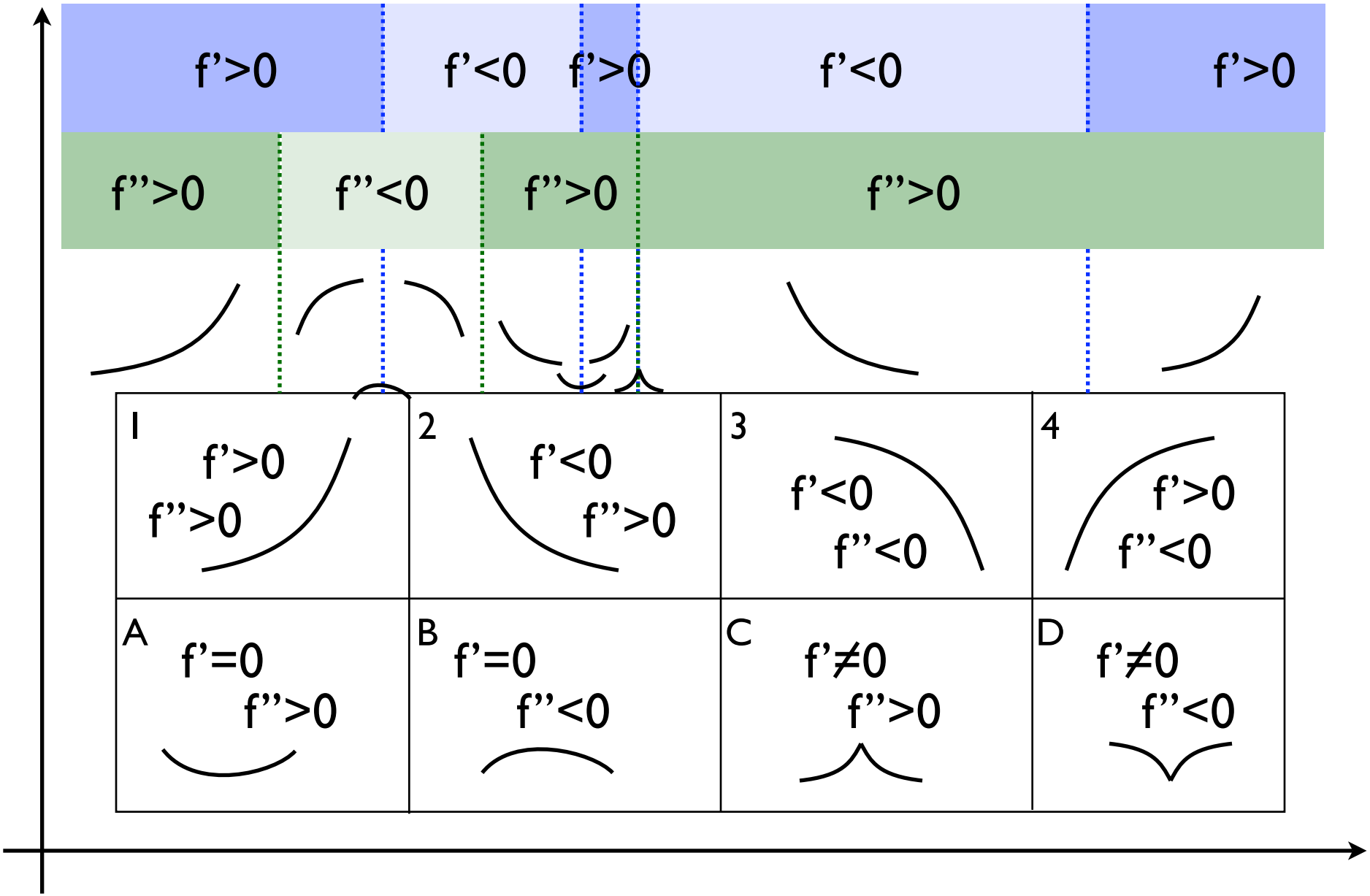

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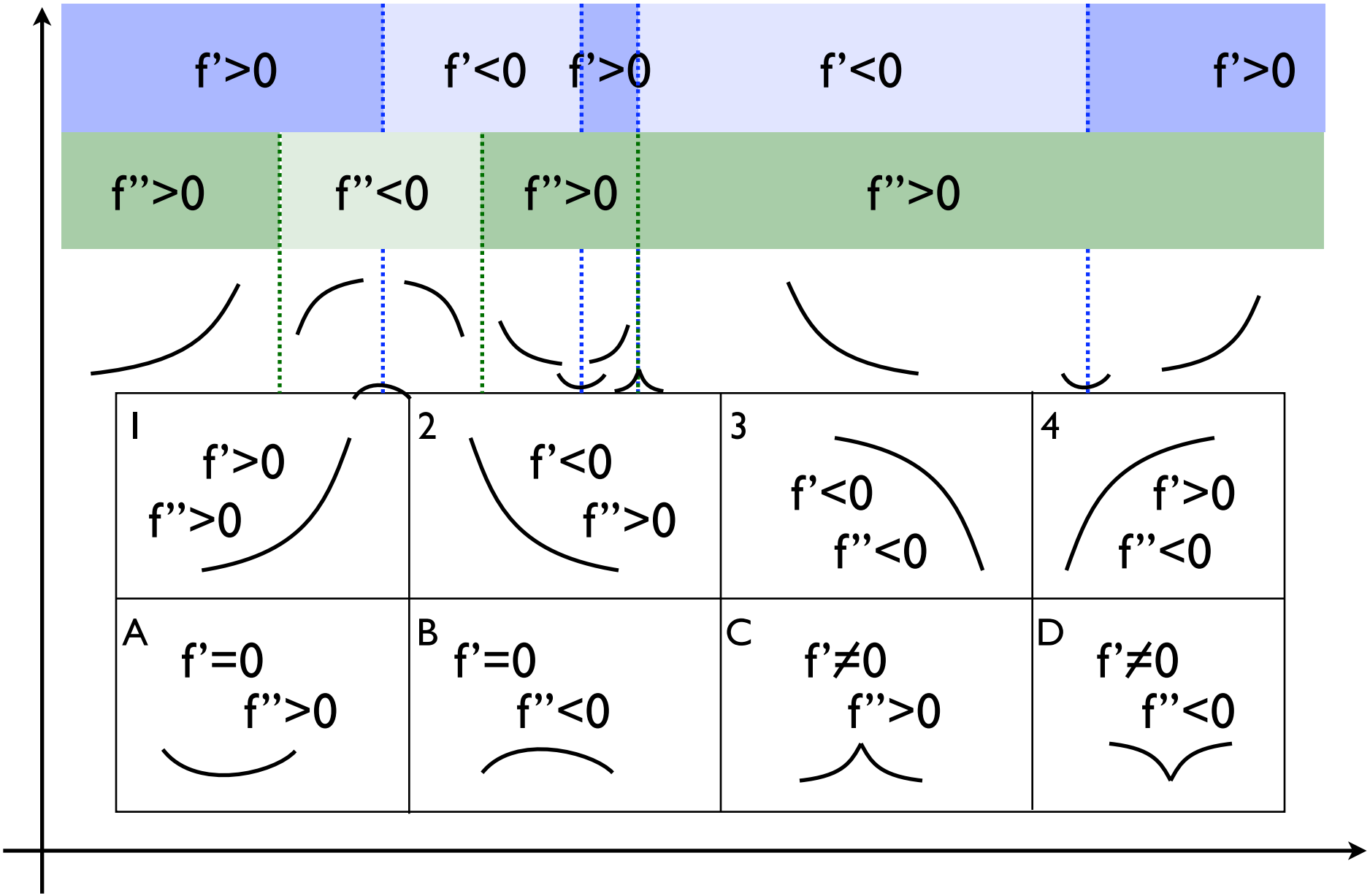

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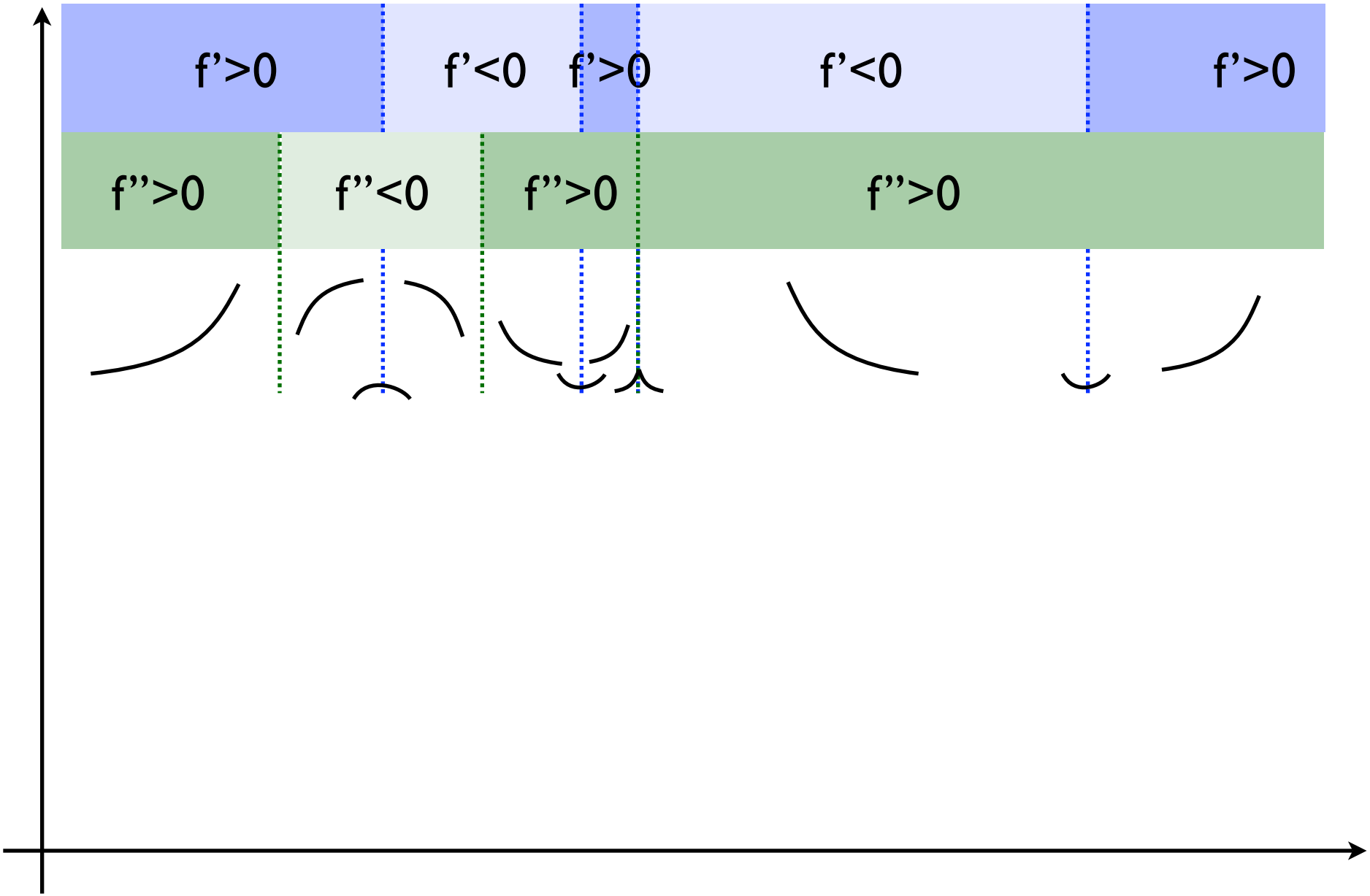

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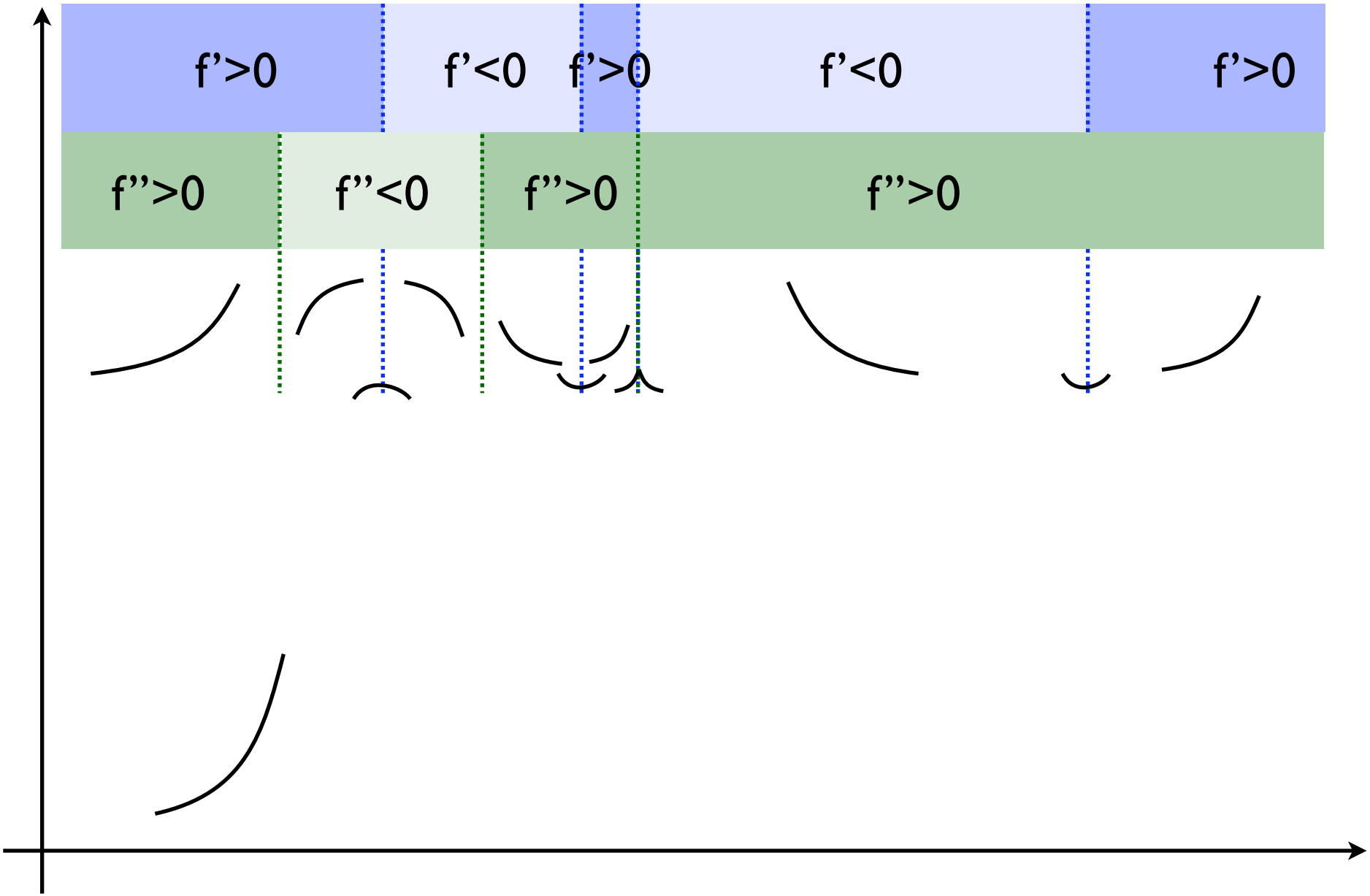

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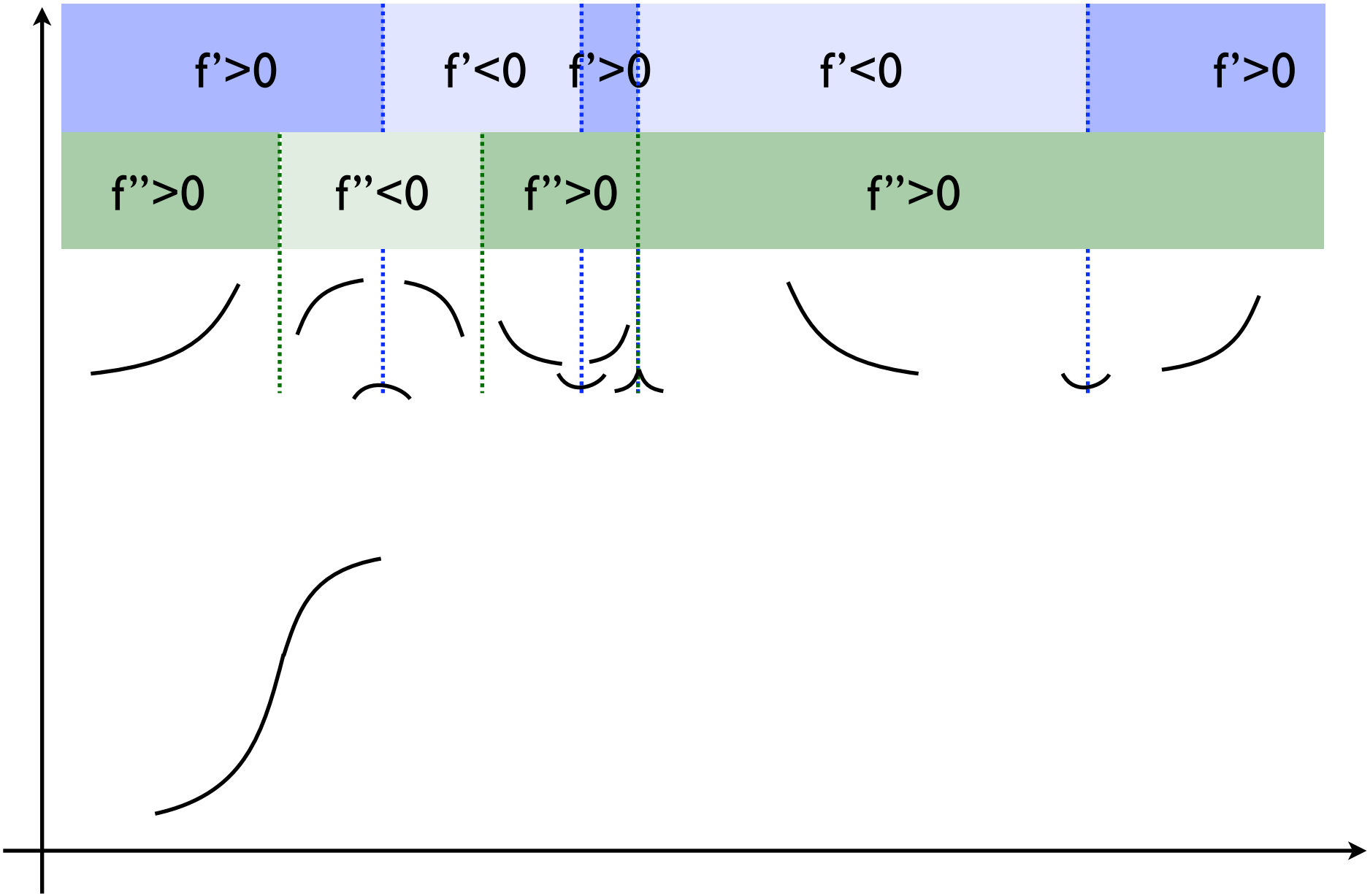

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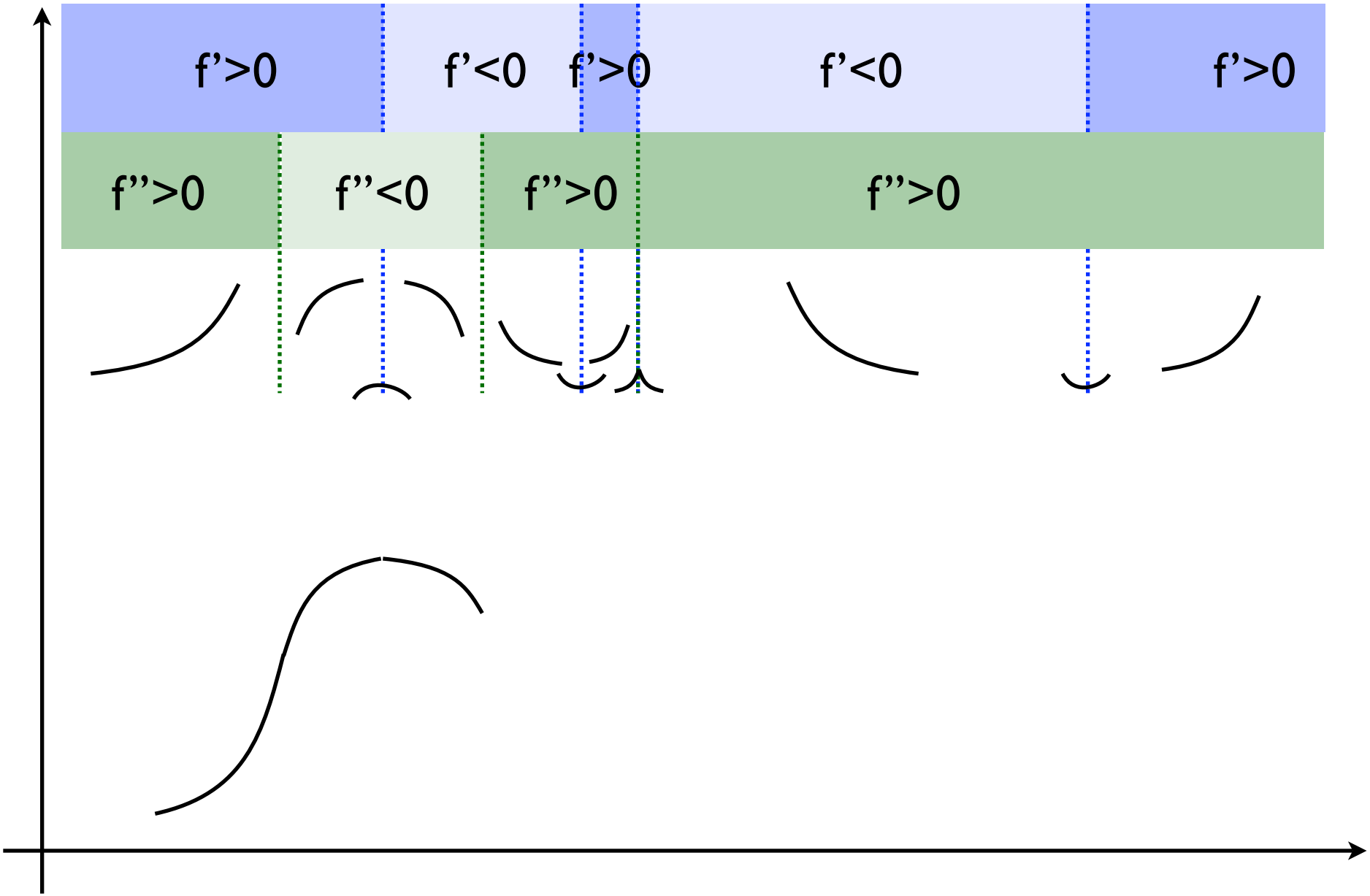

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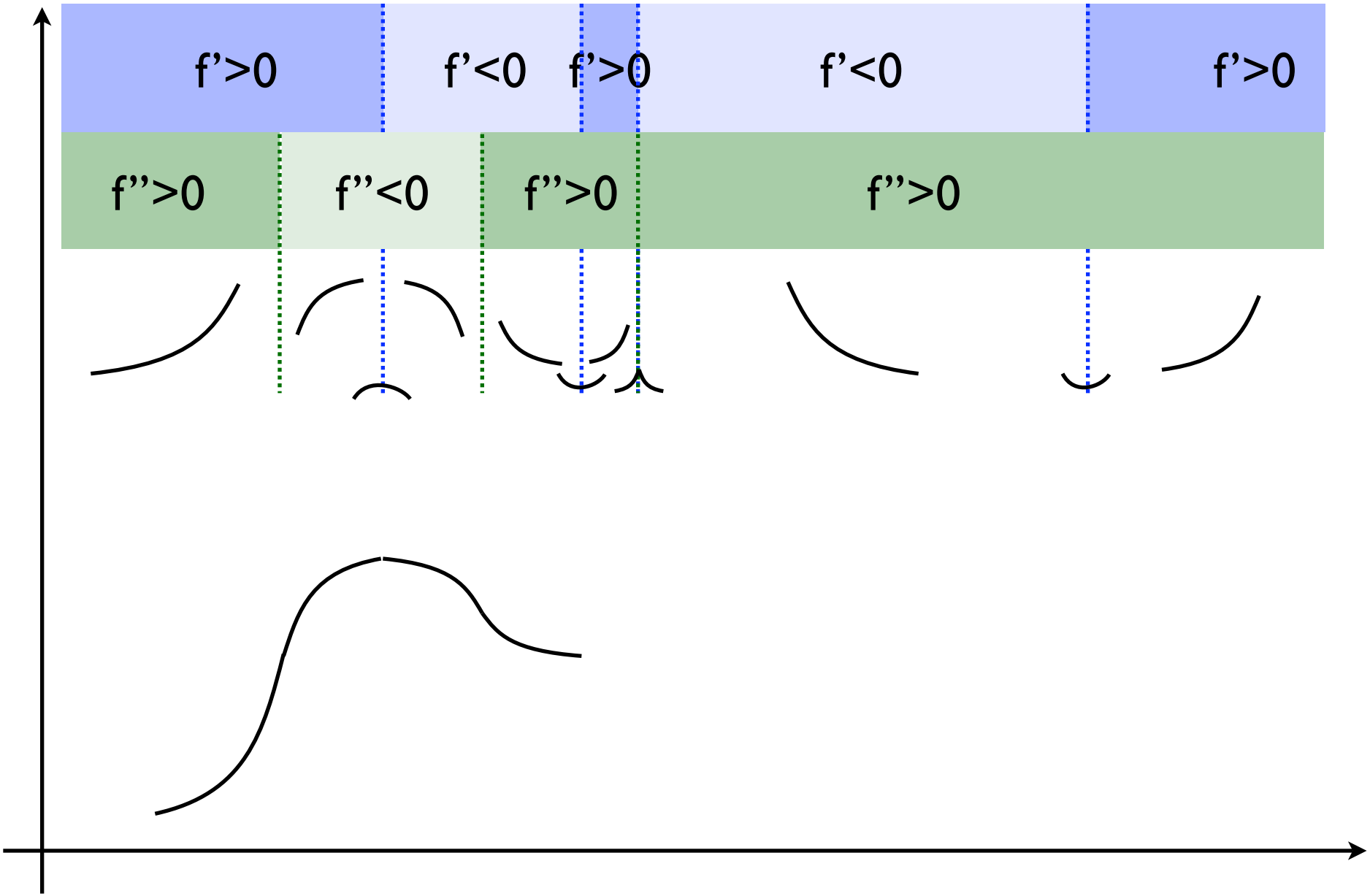

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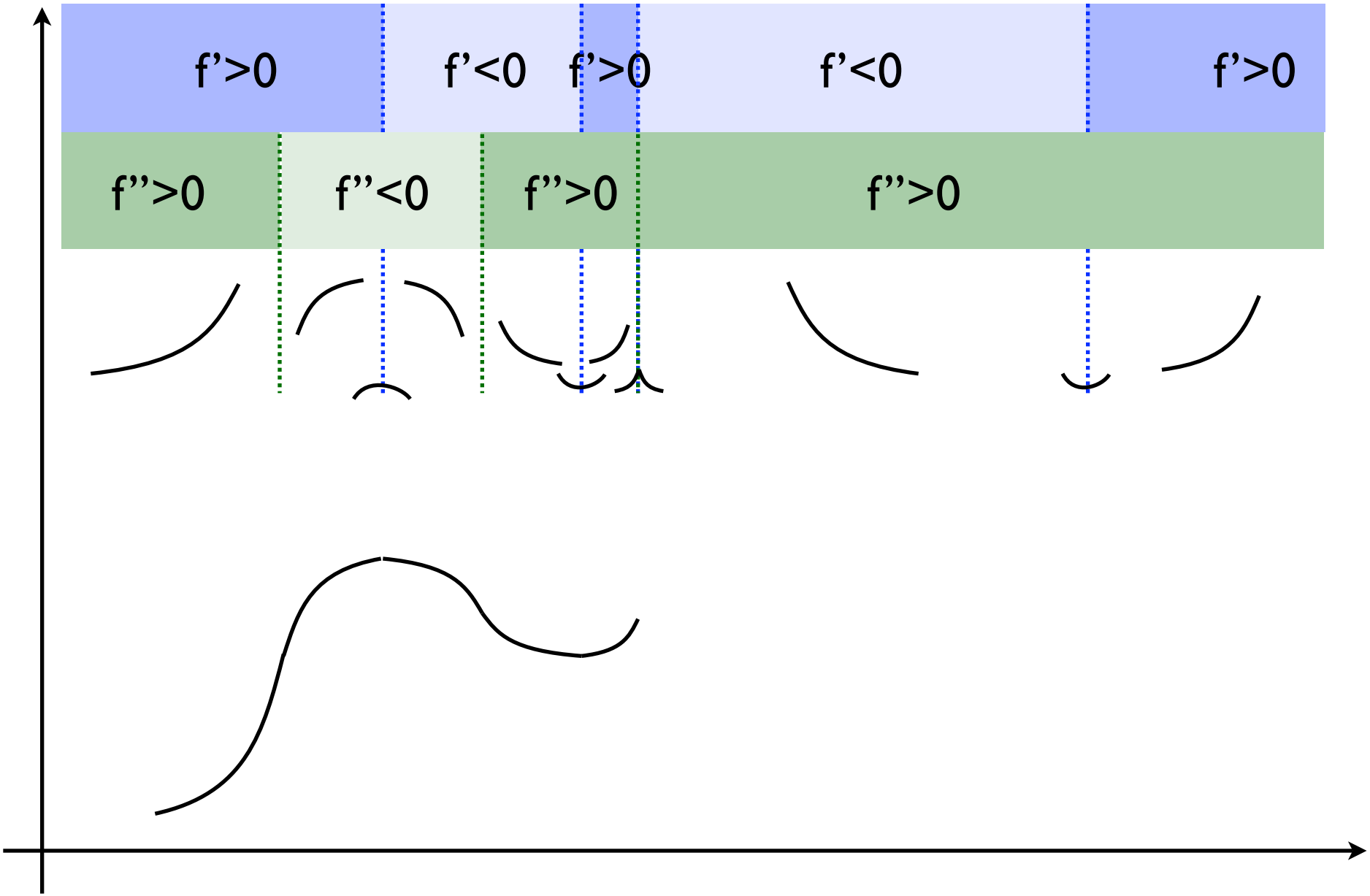

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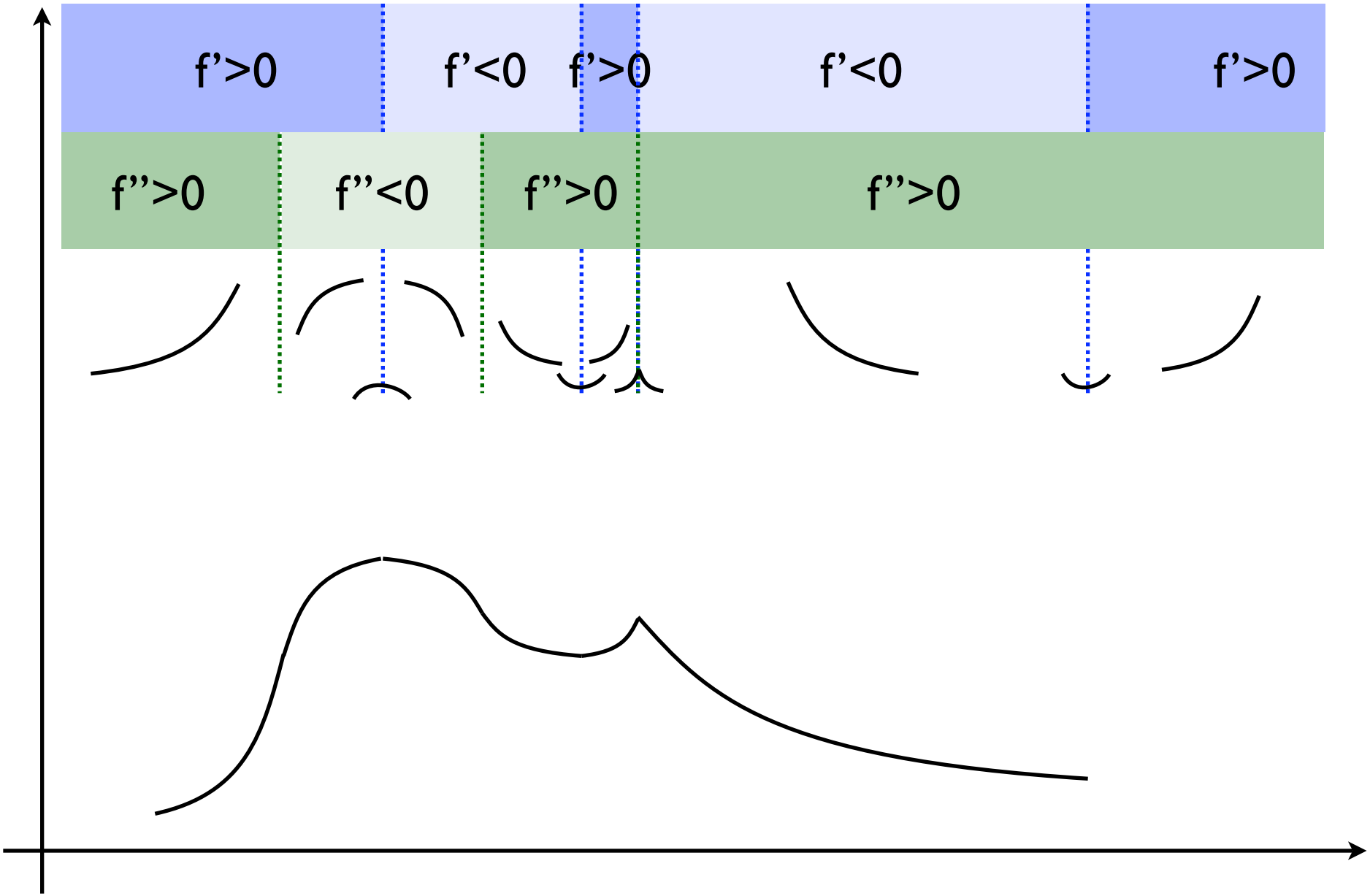

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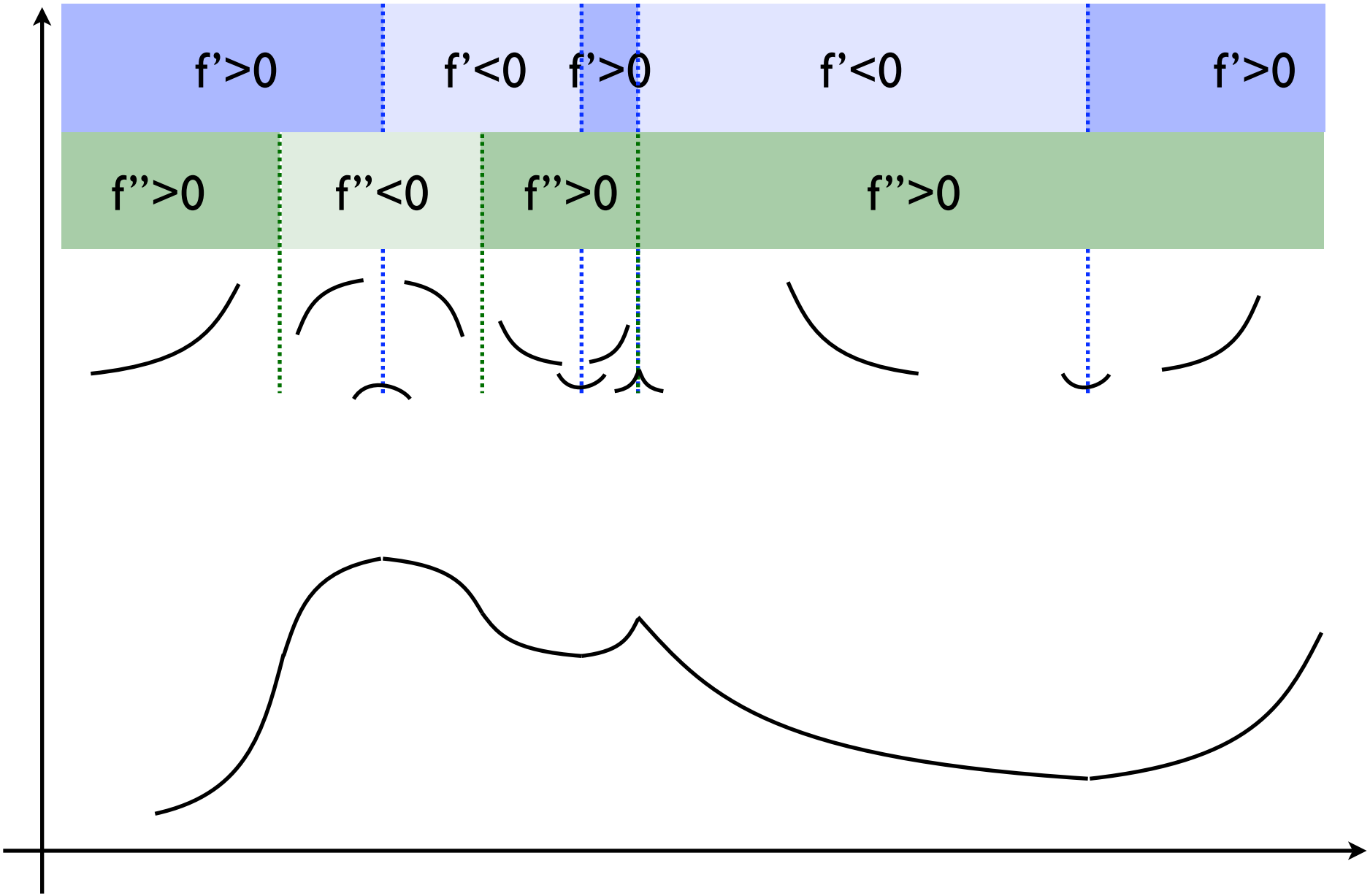
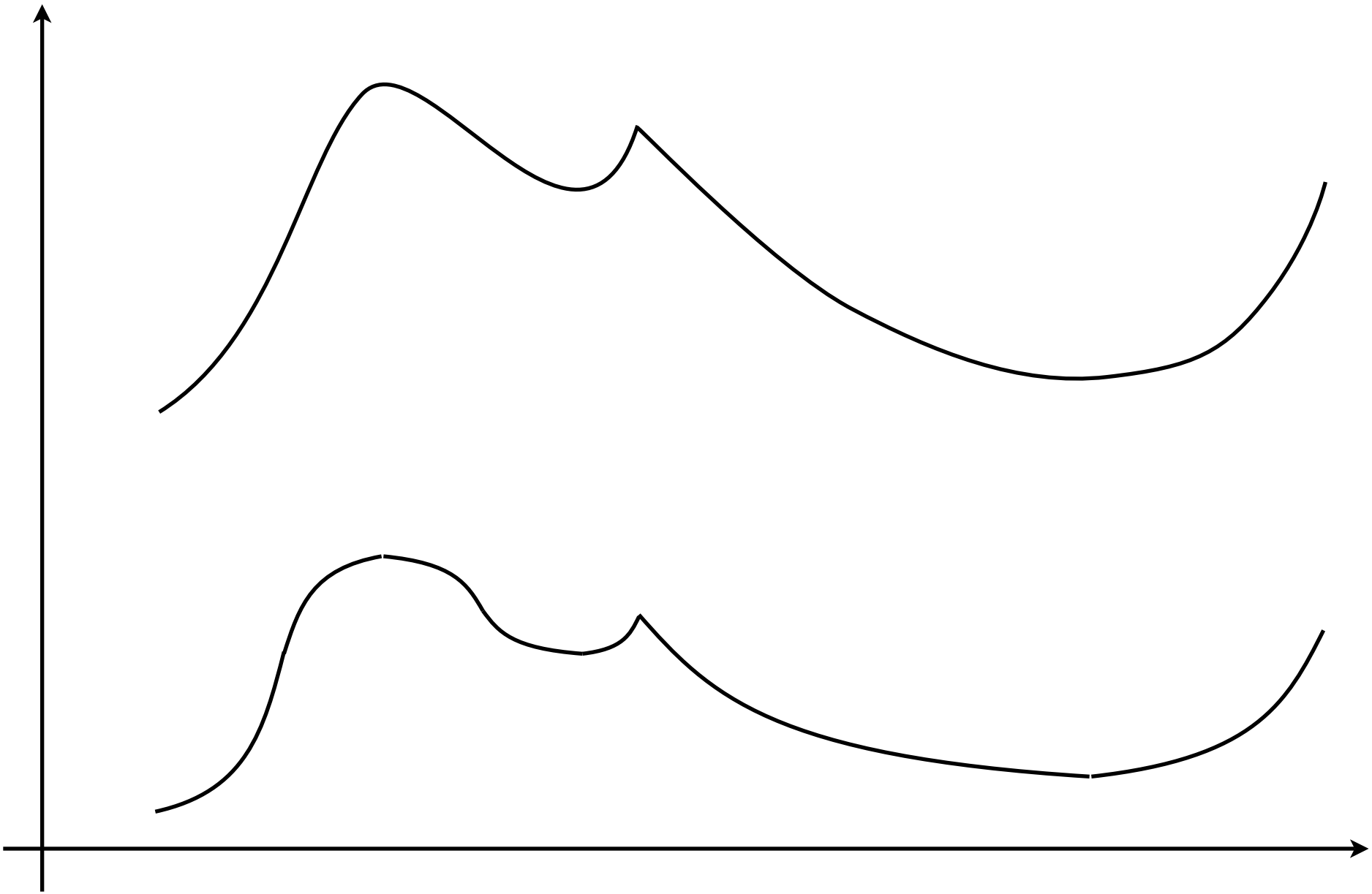
Reconstructing the graph