

4.3 Connecting f' & f'' with the graph of f

first derivative test for local extrema of continuous functions

if f' changes from (+) to (-)

if f' changes from (-) to (+)

no sign change:

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left endpt:

right endpt:

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Find the local extrema, increasing, decreasing behavior

$$y = x^3 - 12x - 5$$

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Find the local extrema $y = (x^2 - 3)e^x$

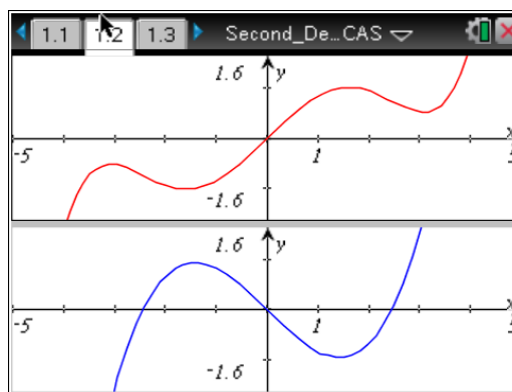
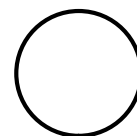
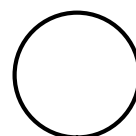
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Concavity test

$$f'' > 0$$

$$f'' < 0$$

f'' changes sign:

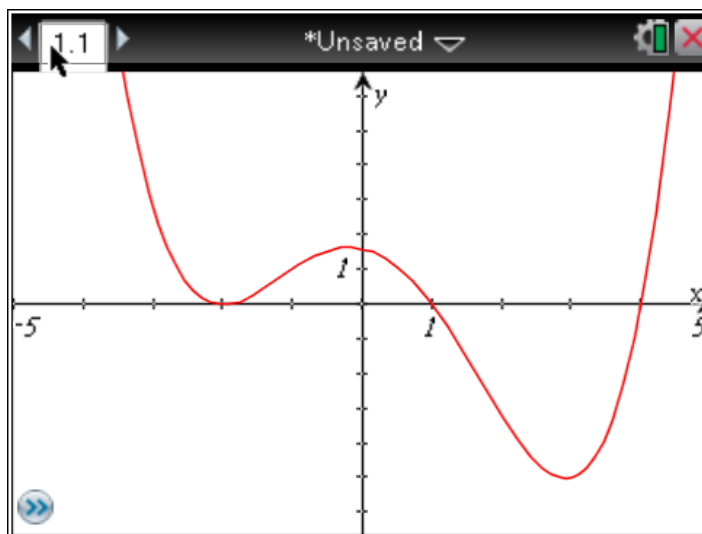


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Find all points of inflection for: $y = e^{-x^2}$

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Given the graph of f' Sketch a possible graph of f .



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Second derivative test for local extrema:

$$\text{if } f' = 0 \quad \& \quad f'' > 0$$

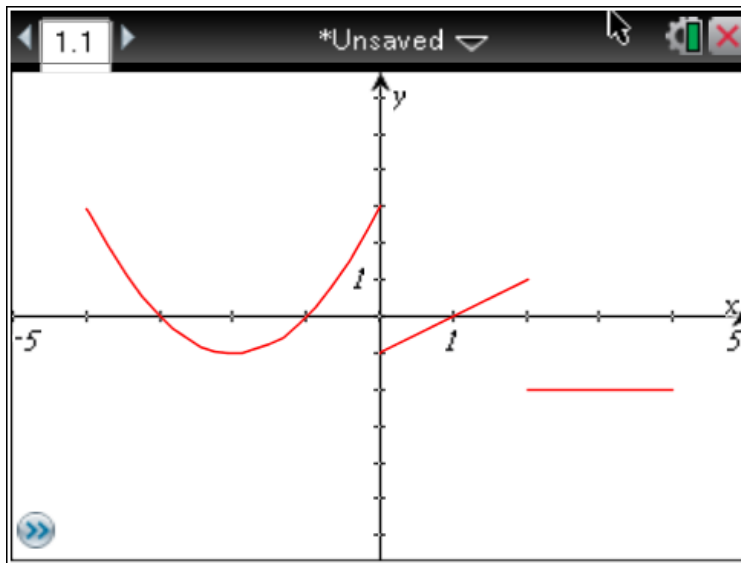
$$\text{if } f' = 0 \quad \& \quad f'' < 0$$

Find the local extrema using the second derivative test:

$$y = \frac{1}{3}x^3 - x$$

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Given the graph of f' Sketch a possible graph of f .



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