What does f' say about f ?

Quick Check

Indicate the intervals on which the graphed function is:

- Increasing
- Decreasing
- Constant



Q Observe the derivative to test for increasing and decreasing functions.



Choose one in each scenario

 $f ext{ increasing on interval } _$ $\implies f' ext{ is } + ext{ or } - ext{ or } 0$

f decreasing on interval $_$ $\implies f' ext{ is } + ext{ or } - ext{ or } 0$

 $f \text{ constant on interval} _$ $\implies f' \text{ is } + or - or 0$

Test for Increasing and Decreasing Functions

Find where the function $f(x) = 3x^4 - 4x^3 - 12x^2 + 5$ is increasing and where it is decreasing algebraically.

 \Rightarrow Observe the derivative at the x-values where the function goes from increasing to decreasing and vice versa. Use this to set up test intervals.

The First Derivative Test

Tell whether x = c is a local maximum point, a local minimum point, or neither.





The graph of the derivative f' of a function f is shown.

- 1. On what intervals is f increasing or decreasing.
- 2. At what values of x does f have a local extrema.



Applying the First Derivative Test

1. Find the relative extrems of $f(x) = (x^2 - 4)^{2/3}$.

2. Find the relative extrema of $f(x)=rac{x^2}{x^2-9}.$

3. Find the relative extrema of $f(x) = x^4 - 2x^2$.