

Concavity

The graph of a differentiable function

Second derivative test for concavity

A point where the graph of the function has a tangent line and where the concavity changes is a

If $f'(c) = 0$ and $f''(c) < 0$ then

If $f'(c) = 0$ and $f''(c) > 0$ then

If $f'(c) = 0$ and $f''(c) = 0$ then

Graphing $y=f(x)$

1.

6.

2.

7.

3.



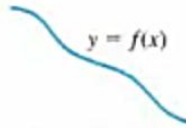






8.

4.

9.

5.

Behaviours of some graphs

 <p>$y = f(x)$ Differentiable \Rightarrow smooth, connected; graph may rise and fall</p>	 <p>$y = f(x)$ $y' > 0 \Rightarrow$ rises from left to right; may be wavy</p>	 <p>$y = f(x)$ $y' < 0 \Rightarrow$ falls from left to right; may be wavy</p>
 <p>or</p> <p>$y'' > 0 \Rightarrow$ concave up throughout; no waves; graph may rise or fall</p>	 <p>or</p> <p>$y'' < 0 \Rightarrow$ concave down throughout; no waves; graph may rise or fall</p>	 <p>y'' changes sign at an inflection point</p>
 <p>or</p> <p>y' changes sign \Rightarrow graph has local maximum or local minimum</p>	 <p>$y' = 0$ and $y'' < 0$ at a point; graph has local maximum</p>	 <p>$y' = 0$ and $y'' > 0$ at a point; graph has local minimum</p>



You will not have to write down all the examples given in the video, however please at least try to sketch the graph of the given function according to the steps followed for the examples in the videos.

Try It: $f'(x) = x^4 - 4x^3 + 10$