AP FRQ

Graph of f'
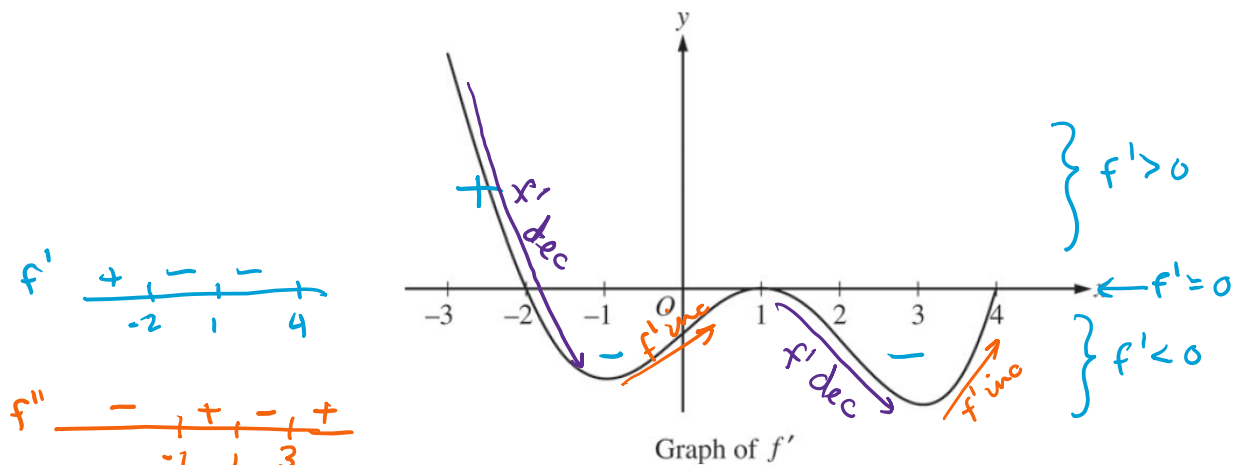
The figure above shows the graph of f', the derivative of a twice-differentiable function f, on the interval $[-3, 4]$. The graph of f' has horizontal tangents at $x = -1$, $x = 1$, and $x = 3$. The areas of the regions bounded by the x-axis and the graph of f' on the intervals $[-2, 1]$ and $[1, 4]$ are 9 and 12, respectively.

(a) Find all x-coordinates at which f has a relative maximum. Give a reason for your answer.

(b) On what open intervals contained in $-3 < x < 4$ is the graph of f both concave down and decreasing? Give a reason for your answer.
↳f' dec   ↳$f' < 0$

→ f'' changes sign

(c) Find the x-coordinates of all points of inflection for the graph of f. Give a reason for your answer.

a) f has rel. max @ $x = -2$ b/c f' changes from pos to neg @ $x = -2$.

b) f is concave down and decreasing on $(-2, -1) \cup (1, 3)$ b/c f' dec and $f' < 0$ on those intervals.

c) f has inf pts. @ $x = -1$, $x = 1$, and $x = 3$ b/c f' changes from inc to dec @ $x = 1$ and from dec to inc @ $x = -1$ and $x = 3$.
(or f'' changes sign @ those x-values)