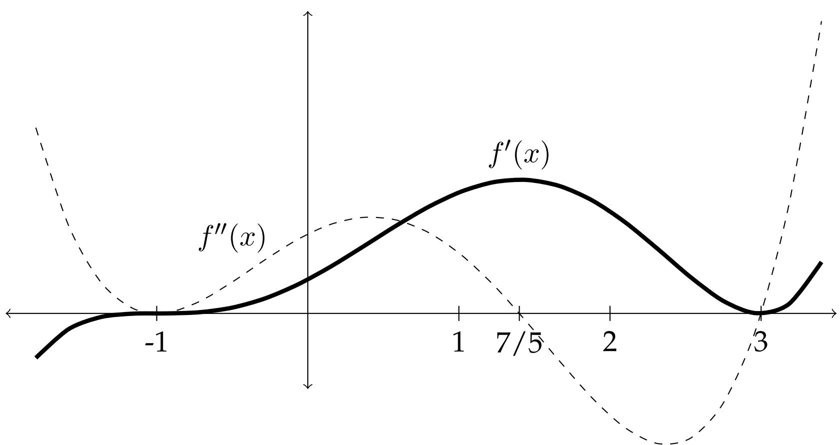
4-3 Sketching Functions using Derivatives

property of f	**how to recognize it**
f is *increasing* on (a, b) if $f(x_1) \geq f(x_2)$ for all x_1, x_2 in (a, b)	$f'(x) \geq 0$
f is *decreasing* on (a, b) if $f(x_1) \leq f(x_2)$ for all x_1, x_2 in (a, b)	$f'(x) \leq 0$
f is *concave up* on (a, b) if $f'(x)$ is increasing on (a, b)	$f''(x) \geq 0$
f is *concave down* on (a, b) if $f'(x)$ is decreasing on (a, b)	$f''(x) \leq 0$
f has a *local maximum* at $x = c$ if $f(c) \geq f(x)$ for all x near c	$f'(c) = 0$ and f' changes from $+$ to $-$ at c $\Longleftrightarrow$ $f''(c) < 0$
f has a *local minimum* at $x = c$ if $f(c) \leq f(x)$ for all x near c	$f'(c) = 0$ and f' changes from $-$ to $+$ at c $\Longleftrightarrow$ $f''(c) > 0$
f has an *inflection point* at $x = c$ if f changes concavity at c	$f'(c)$ has a local max or min $\Longleftrightarrow$ $f''(c) = 0$ and f'' changes sign at c

Below are the graphs of the FIRST DERIVATIVE, $f'(x)$, and the SECOND DERIVATIVE, $f''(x)$, of some unknown function f. Note that $f'(x)$ is the solid curve and $f''(x)$ is the dashed curve. (Assume the domain of all the functions is $(-\infty, \infty)$ and that the functions continue in the way that they are going outside the area shown.) Sketch the graph of $f(x)$ on the given axes, and identify all the information about $f(x)$ required in the table.



property of f	**interval or point(s)**
f is increasing	
f is decreasing	
f has a local max	
f has a local min	
f is concave up	
f is concave down	
f has an inflection point