Warm-Up

Given the graph of the DERIVATIVE of f at left, at which of the following (approximate) values of x does f have an inflection point?

(a) -4
(b) -3
(c) more than one of the other answers is correct
(d) 5
(e) 0
1 5.1: Graphical Interpretation of $f$, $f'$, and $f''$

Graphical Interpretations of $f'$:
If $f'(x) > 0$ for all $x \in (a, b)$ then $f$ is \textit{increasing for all $x \in (a, b)$}.
If $f'(x) < 0$ for all $x \in (a, b)$ then $f$ is \textit{decreasing for all $x \in (a, b)$}.

\textbf{Example:} Draw a function $f$ from $(1,0)$ to $(4,5)$ with $f' > 0$:

\begin{center}
\includegraphics[width=0.8\textwidth]{example_diagram.png}
\end{center}

\textit{different concavity}
Definitions:
a differentiable function $f$ is concave up on an interval $(a, b)$ if and only if $f'$ is increasing on $(a, b)$
a differentiable function $f$ is concave down on an interval $(a, b)$ if and only if $f'$ is decreasing on $(a, b)$

Therefore...
If $f''(x) > 0$ for all $x \in (a, b)$, then $f'$ is incr and $f$ is conc up for all $x \in (a, b)$
If $f''(x) < 0$ for all $x \in (a, b)$, then $f'$ is decr and $f$ is conc down for all $x \in (a, b)$

If $f''(x) = 0$ at $x = a$, $f$ may be changing concavity at $x = a$.
If so, then $(a, f(a))$ is called an inflection point.
Example: PROPERTIES OF THE GRAPH Maplet

The numbers appearing in your answers must be chosen from the following list:
-10, 0, -7, -6.39, -5.77, -5, 0, 0.88, -3, 0, 0, 3.03, 5.10, 7, 10, 12

On what interval(s) is f decreasing?

Give the x-coordinate(s) of all inflection point(s) of f.

Which of these graphs is f? Click below the Plot.

Which of these graphs is f''? Click below the Plot.
On Beyond Average: Sketch the graph of a continuous function which satisfies the following:

- $f'(x) < 0$ for $x \in (-1, 1)$
- $f'(x) > 0$ for $x \in (-\infty, -1) \cup (1, \infty)$
- $f(-1) = 4, f(1) = 0$
- $f''(x) < 0$ for all $x \neq 1$