• $f'(x)$ indicates if it is Increasing or Decreasing or neither
  $f'(x) > 0$ : increasing, rising
  $f'(x) < 0$ : decreasing, falling
  $f'(x) = 0$ : no changes, horizontal slope for the tangent line

• $f''(x)$ indicates if it is concave up, down or neither
  $f''(x) > 0$ : concave up
  $f''(x) < 0$ : concave down
  $f''(x) = 0$ : inflection point, the point where concavity changes.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Answer</th>
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</thead>
<tbody>
<tr>
<td>$f'(x) &lt; 0$</td>
<td>$f'(x) = 0$ and $f''(x) &lt; 0$</td>
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<tr>
<td>$f'(x) &gt; 0$</td>
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Example 1. Referring to this graph, indicate the points or intervals where the following conditions can hold:
Example 2: Draw possible graph for \( f(x) \) by using the graph information of \( f''(x) \) and \( f'(x) \):

a) Draw possible shape for:

\[
\begin{align*}
  f''(x) &= 0 \text{ at: } x = b, x = d \\
  f''(x) &< 0 \text{ on: } b < x < d \\
  f''(x) &> 0 \text{ on: } x > d \text{ and } x < b
\end{align*}
\]

as concave up or concave down or neither.

b) Draw possible shape for:

\[
\begin{align*}
  f'(x) &= 0 \text{ at: } x = a, x = c, x = e \\
  f'(x) &< 0 \text{ on: } x < a \text{ and } c < x < e \\
  f'(x) &> 0 \text{ on: } x > e \text{ and } a < x < c
\end{align*}
\]

as rising, falling or neither:

c) Use the above information to finalize the graph of \( f(x) \) if:

\[
\begin{align*}
  f(a) &= -30 \\
  f(b) &= 5 \\
  f(c) &= 25 \\
  f(d) &= -10 \\
  f(e) &= -40
\end{align*}
\]

d) Fill the following:

\[
\begin{align*}
  f'(x) &= 0 \text{ and } f''(x) > 0 \text{ at: } x = \\
  f'(x) &= 0 \text{ and } f''(x) < 0 \text{ at: } x =
\end{align*}
\]