Warm-up Problems

1. Draw a graph that matches the given data.
   Label all local max and mins and all inflections points.

<table>
<thead>
<tr>
<th>$f''(x)$</th>
<th>$-$</th>
<th>$+$</th>
<th>$+$</th>
<th>$-$</th>
<th>$+$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$f'(x)$</td>
<td>$+$</td>
<td>$+$</td>
<td>$-$</td>
<td>$-$</td>
<td>$+$</td>
</tr>
<tr>
<td>$x &lt; 3$</td>
<td>$3 &lt; x &lt; 4$</td>
<td>$4 &lt; x &lt; 5$</td>
<td>$5 &lt; x &lt; 6$</td>
<td>$x &gt; 6$</td>
<td></td>
</tr>
</tbody>
</table>

Lecture Problems

2. Suppose you are given:

\[ f(x) = \frac{4x}{x^2 + 1} \]
\[ f'(x) = -\frac{4(x - 1)(x + 1)}{(x^2 + 1)^2} \]
\[ f''(x) = \frac{8x(x^2 - 3)}{(x^2 + 1)^3} \]

(a) Find all critical points of $f$.
(b) Find all possible inflection points of $f$.
(c) Find all intervals where $f$ is increasing and decreasing.
(d) Find all intervals where $f$ is concave up and down.
(e) Find all local max and mins of $f$.
(f) Find all inflection points of $f$.
(g) Draw a nice graph of $f$. 