1. The function $f(x)$ is continuous and has the following properties:

(a) $f'(-3) = 0$, $f'(2) = 0$, $f'(5) = DNE$, $f''(-3) \neq 0$, $f''(0) = 0$, $f''(2) \neq 0$, $f''(5) = DNE$.

(b) $f'(x) > 0$ for $-3 < x < 0$ and $0 < x < 2$ and for $x > 5$. Also $f'(x) < 0$ for $x < -3$, for $2 < x < 5$.

(c) $f''(x) > 0$ for $x < -3$, for $-3 < x < 0$, and for $x > 5$. Also $f''(x) < 0$ for $0 < x < 2$ and for $2 < x < 5$.

Determine the critical points of $f(x)$. Use the first derivative test to determine which critical points give a maximum value of $f(x)$ and which give a minimum value. Also use the second derivative test to determine which critical points give a maximum value of $f(x)$ and which give a minimum value. Finally, determine the $x$ coordinate of all inflection points.

<table>
<thead>
<tr>
<th>$f'(x) &lt; 0$</th>
<th>$f'(x) &gt; 0$</th>
<th>$f'(x) &gt; 0$</th>
<th>$f'(x) &lt; 0$</th>
<th>$f'(x) = 0$</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>0</td>
<td>2</td>
<td>5</td>
<td></td>
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</tbody>
</table>

**Local Minimum Value at $x = -3$**

**Local Maximum Value at $x = 2$**

**Local Minimum Value at $x = 5$**

**$f''(x) > 0$**

**$f''(x) < 0$**

**$f''(x) < 0$**

**$f''(x) > 0$**

**Using Second Derivative Test**

Local Minimum at $x = -3$ and $x = 5$ are inflection points.

2. The function $f(x)$ is continuous and has the following properties:

(a) $f'(x) > 0$ for $-3 < x < 0$, and for $0 < x < 2$ and for $2 < x < 5$. Also $f'(x) < 0$ for $x < -3$ and for $x > 5$.

(b) $f''(x) > 0$ for $x < -3$ for $-3 < x < 0$, for $2 < x < 5$, and for $x > 5$. Also $f''(x) < 0$ for $0 < x < 2$.

Sketch a graph of a function $f(x)$ which satisfies these conditions.