5. Let \( f \) be a function that is even and continuous on the closed interval \([-3,3]\). The function \( f \) and its derivatives have the properties indicated in the table below.

<table>
<thead>
<tr>
<th>( x )</th>
<th>0</th>
<th>0 &lt; ( x &lt; 1 )</th>
<th>1</th>
<th>1 &lt; ( x &lt; 2 )</th>
<th>2</th>
<th>2 &lt; ( x &lt; 3 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( f(x) )</td>
<td>1</td>
<td>Positive</td>
<td>0</td>
<td>Negative</td>
<td>-1</td>
<td>Negative</td>
</tr>
<tr>
<td>( f'(x) )</td>
<td>Undefined</td>
<td>Negative</td>
<td>0</td>
<td>Negative</td>
<td>Undefined</td>
<td>Positive</td>
</tr>
<tr>
<td>( f''(x) )</td>
<td>Undefined</td>
<td>Positive</td>
<td>0</td>
<td>Negative</td>
<td>Undefined</td>
<td>Negative</td>
</tr>
</tbody>
</table>

(a) Find the \( x \)-coordinate of each point at which \( f \) attains an absolute maximum value or an absolute minimum value. For each \( x \)-coordinate you give, state whether \( f \) attains an absolute maximum value or an absolute minimum value.

(b) Find the \( x \)-coordinate of each point of inflection on the graph of \( f \). Justify your answer.

(c) In the \( xy \)-plane provided below, sketch the graph of a function with all the given characteristics of \( f \).

\[ 
\begin{array}{c}
\text{Graph}
\end{array}
\]

2006 form B #2- use a graphing calculator

Let \( f \) be the function defined for \( x \geq 0 \) with \( f(0) = 5 \) and \( f' \), the first derivative of \( f \), given by \( f'(x) = e^{(-x/4)} \sin(x^2) \). The graph of \( y = f'(x) \) is shown above.

(a) Use the graph of \( f' \) to determine whether the graph of \( f \) is concave up, concave down, or neither on the interval \( 1.7 < x < 1.9 \). Explain your reasoning.

(b) On the interval \( 0 \leq x \leq 3 \), find the value of \( x \) at which \( f \) has an absolute maximum. Justify your answer.

(c) Write an equation for the line tangent to the graph of \( f \) at \( x = 2 \).
The figure above shows the graph of \( f' \), the derivative of a twice-differentiable function \( f \), on the closed interval \( 0 \leq x \leq 8 \). The graph of \( f'' \) has horizontal tangent lines at \( x = 1 \), \( x = 3 \), and \( x = 5 \). The areas of the regions between the graph of \( f'' \) and the \( x \)-axis are labeled in the figure. The function \( f \) is defined for all real numbers and satisfies \( f(8) = 4 \).

(a) Find all values of \( x \) on the open interval \( 0 < x < 8 \) for which the function \( f \) has a local minimum. Justify your answer.

(b) Determine the absolute minimum value of \( f \) on the closed interval \( 0 \leq x \leq 8 \). Justify your answer.

(c) On what open intervals contained in \( 0 < x < 8 \) is the graph of \( f \) both concave down and increasing? Explain your reasoning.

(d) The function \( g \) is defined by \( g(x) = (f(x))^3 \). If \( f'(3) = -\frac{5}{2} \), find the slope of the line tangent to the graph of \( g \) at \( x = 3 \).