3. Table 1 below displays some values of an invertible, differentiable function $f(x)$, while Figure 2 depicts the graph of the function $g(x)$. Set $h(x) = f(g(x))$ and $j(x) = \frac{f(x)}{g(x)}$.

Table 1

<table>
<thead>
<tr>
<th>$x$</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>$f(x)$</td>
<td>-5</td>
<td>-2</td>
<td>2</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>$f'(x)$</td>
<td>5</td>
<td>6</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>$f''(x)$</td>
<td>1</td>
<td>-1</td>
<td>-3</td>
<td>-2</td>
<td>0</td>
</tr>
</tbody>
</table>

Evaluate each of the following. To receive partial credit you must show your work!

(a) (4 points) $(f^{-1})'(2)$

(b) (4 points) $h'(4)$

(c) (4 points) $h''(4)$ [Hint: you may want to use your work from part (b).]

(d) (4 points) $j'(4)$
5. [13 points] The equation below implicitly defines a hyperbola.

\[ x^2 - y^2 = 2x + xy + y + 2. \]

a. [5 points] Find \( \frac{dy}{dx} \).

b. [4 points] Consider the two points (4, 2) and (2, -1). Show that one of these points lies on the hyperbola defined above, and one does not.

c. [4 points] For the point in part (b) which lies on the hyperbola, find the equation of the line which is tangent to the hyperbola at this point.