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 $h(x) = f\big(g(x)\big)$ and $j(x) = \dfrac{f(x)}{g(x)}$.

Table 1

x	1	2	3	4	5
$f(x)$	-5	-2	2	4	7
$f'(x)$	5	6	2	3	3
$f''(x)$	1	-1	-3	-2	0

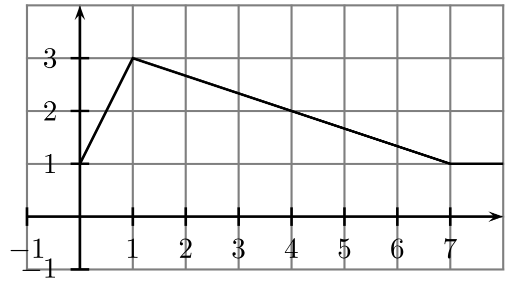

Figure 2: Graph of $g(x)$

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

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

(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.