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.