Written Homework

Your carefully written solutions to the following questions will be due at the beginning of class on Tuesday, February 16.

1. Use implicit differentiation to compute the derivative of \( y = \tan^{-1} x \). (Remember that \( \tan^{-1} x \) is the inverse tangent – not the reciprocal of tangent!) Simplify your answer so that there are no trigonometric functions remaining in your final result. (Refer to the process used in Worksheet 8 to simplify the derivative of \( \sin^{-1} x \).)

2. Use implicit differentiation to prove the Quotient Rule. (For simplicity, you may assume that the numerator and denominator of the function are always positive.)

3. The graph at right shows the ellipse \( \frac{x^2}{4} + \frac{y^2}{16} = 1 \) along with a line that is tangent to the parabola and that passes through the point (6,0). (a) Use calculus to find the coordinates of the point where the line touches the ellipse. (b) Find an equation for the line.

*Hint:* There are two unknowns here: the x- and y-coordinates of the point. You will need to identify two equations that allow you to solve for those two unknowns.