1. Differentiate \( y = \frac{\sec x}{1 + \cot x} \).

2. Where does the normal line to the parabola \( y = x - x^2 \) at the point \((1, 0)\) intersect the parabola a second time?
1. Differentiate \( y = \frac{\cot x}{1-\csc x} \).

2. Find the parabola with equation \( y = ax^2 + bx \) whose normal line at \((1, 1)\) has equation \( y = -\frac{1}{3}x + \frac{4}{3} \).