Q.1: Verify that $y = x \sin(x) + \cos(x) \ln(\cos(x))$ is a solution of $y'' + y = \sec(x)$.

Q.2: Determine a region of the $xy$-plane for which the differential equation $(\sqrt{y^2 - 9}) y' = (x^2 - 1)(y^2 - 9)$ would have a unique solution containing the point $(x_0, y_0)$.

Q.3: Solve the differential equation $\sqrt{1 - y^2} \, dx - \sqrt{1 - x^2} \, dy = 0$ with $y \left( \frac{1}{2} \right) = \frac{\sqrt{3}}{2}$.