Answer the following on another sheet of paper.

Part I. Differentiate the following functions.

1. \( f(x) = (3x^2 + 7x)^{10} \)

2. \( f(x) = \sqrt{x^2 + 9} \)

3. \( f(x) = \cos(5x + 1) \)

Part II.

1. Let \( y = \ln x \) and consider the equation \( e^y = x \). Use implicit differentiation to find \( y' \).

2. Let \( y = e^{\sin x} \). What is \( y' \)? (Hint - use logarithmic differentiation).

Part III. Find derivatives of the following functions.
1. \( \ln(x^2) \)

2. \( e^x \ln x \)

3. \( x^3 \cdot 3^x \)

4. \( \frac{40}{1+2^{-x}} \)

Part IV. Find \( y' \) in terms of \( x \) and \( y \).

1. \( 5\sqrt{x} - 10\sqrt{y} = \sin x \)

2. \( y = \frac{x+1}{y-1} \)

3. \( \sqrt{3x^7 + y^3} = \sin^2 y + 100xy \)