1. Find the derivative, \( \frac{dy}{dx} \), for the expression: \( x^2 y - e^{2x} = \sin y \)  

2. Find the general solution for: \( (x^2 + 9) \frac{dy}{dx} = xy \)  

**HINTS:**  
\[
\int u^n du = \frac{u^{n+1}}{n+1} + C, \quad n \neq -1
\]
\[
\int \frac{1}{u} du = \ln|u| + C
\]

3. Find the absolute maximum and minimum of the following function in the indicated region. Show analytic work for full credit.  

\[ f(x, y) = 6x^2 + 18xy + 4y^2 - 6x - 10y + 5 \quad \text{where} \ x \in [0,1] \text{ and } y \in [0,1] \]