Problems: The Chain Rule with Constraints

Suppose \( w = u^3 - uv^2 \), \( u = xy \) and \( v = u + x \).

1. Find \( \left( \frac{\partial w}{\partial u} \right)_x \) and \( \left( \frac{\partial w}{\partial x} \right)_u \) using the chain rule.

2. Find \( \left( \frac{\partial w}{\partial u} \right)_x \) and \( \left( \frac{\partial w}{\partial x} \right)_u \) using differentials.