1. (1 pt.) Show whether the function \( f(z) = \text{Re} z \) is analytic or not.

2. (1 pt.) Find the analytic function \( w(x, y) = u(x, y) + iv(x, y) \) if \( u(x, y) = x^3 - 3xy^2 \).

3. (1 pt.) Suppose \( f(z) \) is analytic. Show that the derivative of \( f(z) \) with respect to \( z^* \) does not exist unless \( f(z) = \text{const} \).

4. (2 pts.) Let \( w = w(x, y) \), and \( A = \frac{\partial^2 w}{\partial x^2}, B = \frac{\partial^2 w}{\partial x \partial y}, \) and \( C = \frac{\partial^2 w}{\partial y^2} \). From the calculus of functions of 2 variables, we have a saddle point if

\[
B^2 - AC > 0. \tag{1}
\]

With \( f(z) \equiv u(x, y) + iv(x, y) \), apply Cauchy-Riemann conditions and show that neither \( u(x, y) \) nor \( v(x, y) \) has a maximum or minimum in any finite region of the complex plane.