MACT 2123 **Fall 2024**

Worksheet 9: Directional Derivatives and the Gradient Vector

Name: _____ **ID:** _____

Consider the function: $f(x, y, z) = x^2 + y^2 + z^2 - 4y + 6z + 7$, and the point $A(1, 0, -2)$.

1. Find the derivative of f at A in the direction of the vector $2\mathbf{i} - 2\mathbf{j} - \mathbf{k}$.

2. Find the **maximum** possible rate of change of f at A (over all possible directions), and the direction in which it occurs.

3. Find an equation of the plane tangent to the (level) surface $f(x, y, z) = 0$ at A.