

Lecture 13 Worksheet

June 8, 2021

1. Find the directional derivative of $z = 3x - 4xy$ in the direction of $\vec{u} = \langle 1, -1 \rangle$ at $P = (3, 2)$.
2. Let $f = xyz - y^2z$. Find ∇f .
3. Suppose $\frac{\partial f}{\partial x}|_{(0,0)} = 5$ and $\frac{\partial f}{\partial y}|_{(0,0)} = -10$. Find the directional derivative of f in the direction of $\vec{u} = \langle 4, 3 \rangle$ at $(0, 0)$.
4. Let $h(x, y)$ be the height of a surface above the xy -plane. If $h(x, y) = (x - 2)^2 + y^2 + 10$, what direction is most directly downhill at the point $(1, 1)$?