15.5 Directional Derivatives
Multivariable Calculus

https://www.youtube.com/watch?v=GJODOGq7cAY&list=PLHXZ9OQGMqxc_CvEy7xBKRQr6I214QJcd&index=18

Directional Derivative

1. Find the directional derivative of $f(x,y) = 2 - x^2 - y^2$ at $(\frac{1}{2}, -\frac{1}{2})$ in the direction of $\vec{u} = \langle \frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}} \rangle$

Consider the angle the unit vector $\vec{u}$ makes. $\vec{u} =$

2. Let $f(x,y) = xe^y$, at the point $(2, -1)$ find the directional derivative in the direction of $\vec{v} = \langle 2, 3 \rangle$.

3. Find the rate of change of $f(x, y) = x^2 + 2xy - 3y^2$ at the point $(1, 2)$ in the direction indicated by the angle $\theta = \frac{\pi}{4}$.

4. Find the gradient and the directional derivative of the function $f(x, y) = x^2y^3 - 4y$ at the point $(2, -1)$ in the direction of the vector $\vec{v} = \langle 2, 5 \rangle$

5. Find the directional derivative of the function $f(x, y, z) = z^4 - x^3y^2$ at the point $P(1, 3, 2)$ in the direction of point $Q(2, 4, 3)$.