

MATH 231: Calculus of Several Variables
Section 1, 107 Ag Sc & Ind Bldg,
TR 9:05 AM - 9:55 AM

Homework 18: Due Tuesday, November 12

1. Find the directional derivative of the function at the given point in the direction of \vec{v} .

(a) $f(x, y) = e^x \sin y$, $(0, \pi/3)$, $\vec{v} = \langle -6, 8 \rangle$

(b) $g(r, s) = \tan^{-1}(rs)$, $(1, 2)$, $\vec{v} = \langle 3, 5 \rangle$

(c) $f(x, y, z) = \sqrt{xyz}$, $(3, 2, 6)$, $\vec{v} = \langle -1, -2, 2 \rangle$

(d) $H(x, y, z) = x$, $(1, 0, 0)$, $\vec{v} = \langle 1, 1, 1 \rangle$

2. Find the directional derivative of f at the given point in the direction indicated by θ .
(Hint: $\nabla f \cdot \vec{u} = |\nabla f| |\vec{u}| \cos \theta$ and you can assume $|\vec{u}| = 1$)

$$f(x, y) = x^3y + y^2x^2, \quad (1, 2), \quad \theta = \pi/6$$

3. In what direction (unit vector) is the directional derivative at its maximum?

$$f(x, y) = x^3y + y^2x^2, \quad (1, 2)$$

4. Sketch the gradient vectors $\nabla f(-1, 2)$ and $\nabla f(-2, 1)$ for the function f whose level curves are shown.

