

7 For lecture on 10/17

- Let $\vec{F}(x, y, z) = (\sin x, \cos z, \tan y)$ be a vector field. Find the following:
 - $\nabla \cdot \vec{F}$.
 - $\nabla \times \vec{F}$.
 - The Jacobian of \vec{F} .
 - If $\vec{u}(t)$ is a curve in 3-dimension space, with $\vec{u}(0) = (1, 2, 3)$ and $\vec{u}'(0) = (4, 5, 6)$, find $(\vec{F} \circ \vec{u})'(0)$.
- Find the divergence and curl for the vector field $F(x, y) = (e^x \sin y, -\cos x)$.
- Find and classify all local maxima and minima of the function

$$f(x, y) = x^4 + y^4 - 4xy - 38.$$

- Find the absolute maximum and minimum of f in region D , where

$$f(x, y) = \sqrt[3]{x^3 - 48x + y^3 - 12y},$$

$D =$ Closed triangle region with vertices $(-2, 3), (5, 3), (5, -4)$.