

**MATH 202: VECTOR CALCULUS
HOMEWORK FOR FRIDAY WEEK 4**

Problem 1. CAES 4.5.6.

Problem 2. The polar transformation $P : \{(r, \theta) \mid r \geq 0\} \rightarrow \mathbb{R}^2$ takes the (r, θ) -half plane to the (x, y) -plane via $P(r, \theta) = (r \cos \theta, r \sin \theta)$. Determine the Jacobian matrix $P'(r, \theta)$. How can you interpret the (absolute value of the) determinant of $P'(r, \theta)$?

Problem 3. Compute the equation of the tangent plane of $z = e^x \cos y + e^{-x} \sin y$ at the point $(-1, \pi/2, e)$. Use this equation to approximate $f(-1.1, 1.6)$.