

MATH 432/532 SPRING 2017
HOMEWORK 3
DUE JANUARY 25, 2017.
INSTRUCTOR: ROBERT LIPSHITZ

Reminder: homework is due at the *beginning* of class, handed to me or in my mailbox on the second floor of Fenton.

Corrected! Challenge problem now less challenging.

Problems:

- (1) Lee, Exercise 1.7.
- (2) Deduce the inverse function theorem from the implicit function theorem.
- (3) (Ruden, Exercise 9.21) Define $f: \mathbb{R}^2 \rightarrow \mathbb{R}$ by

$$f(x, y) = 2x^3 - 3x^2 + 2y^3 + 3y^2.$$

- (a) Find the four points in $\mathbb{R}^2$ where $Df = 0$.
- (b) Let $S = \{(x, y) \in \mathbb{R}^2 \mid f(x, y) = 0\} = f^{-1}(0)$. Find those points $(a, b) \in S$ which do not have neighborhoods on which the equation $f(x, y) = 0$ can be solved for y in terms of x .

Challenge problems (required for Math 532, optional for 432):

- (4) Show that $\{(z, w) \in \mathbb{C}^2 \setminus \{(0, 0)\} \mid z^2 = w^3\}$ is a topological manifold.

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