

Homework 13
(due Thursday, Dec 11)

Turn in answers only

Exam 1: 2 (aim for countere.g.s that are as simple as possible)

Exam 2: 2 (same advice), 5c

4.5: 3ab

6.1: 11ac (do two steps of Newton's method in each case, but ignore the part about finding a ball that contains the root).

6.2: 1ae

Full solutions

Exam 2: 7a. Find all points $(x, y) \in \mathbf{R}^2$ where the curve $\gamma(t) = (t^2 - 1, t^3 + t)$ is tangent to a level set of $f(x, y) = xy$.

Problem 1. Let $f : \mathbf{R}^3 \rightarrow \mathbf{R}$ be given by $f(x, y, z) = xy^3 + z^2 - 2zy + x^5$. Note that $f(1, 1, 1) = 1$.

- (a) What fairly straightforward computation shows that we can solve the equation $f(x, y, z) = 2$ for $x = h(y, z)$ in terms of y and z near the point $(1, 1, 1)$?
- (b) Do two steps of Newton's method to find a good approximation of the solution x (near $x = 1$) of $f(x, 1.2, .9) = 1$. That is, find a good approximation of $h(1.2, .9)$.
- (c) Is it clear that one could solve for y in terms of x and z near $(1, 1, 1)$? For z in terms of x and y ?