Math 3472
Analysis 3–Assignment 2.

Due March 17 in class.

Questions from textbook, pages 366, 384 and 385: 12.27, 13.2, 13.3, 13.5, 13.6. Also the following problems:

Question A: Consider the function

$$F : \mathbb{R} \times \mathbb{R} \times \mathbb{R} \to \mathbb{R}$$

given by $F(x, y, z) = x^3z^2 - z^3yx$.

1. Explain why there are no neighbourhood U of $(0, 0)$ and V of 0 such that there exists a function $z = g(x, y)$ defined for $(x, y) \in U$ and $z \in V$ and satisfying $F(x, y, g(x, y)) = 0$.
2. Explain why the equation is solvable for z as a function of (x, y) near the point $(1, 1, 1)$. Compute the partials $\partial z/\partial y$ and $\partial z/\partial x$ at this point from the partials of F.

Question B: Do the conditions $xy - xy^2z^3 - z = 3$, $x^2 + y^2 + z^2 = 6$ define y and z as functions of x in a neighborhood of the point $(x, y, z) = (1, -2, -1)$? If so, are these functions continuously differentiable in this neighborhood?