

## Math 365 Homework 1

**Directions:** NEATLY write all solutions on your own paper. Solutions should include details like " by the triangle inequality we get .." You may discuss the problems with others but write up your solutions on your own.

1) Do one step of Newton's method to approximate a solution of

$$\begin{aligned}x + \cos(y) - 1.1 &= 0 \\x^2 - \sin(y) + .1 &= 0.\end{aligned}$$

Does it converge?

2) Define the norm of a square matrix to be  $\|A\| = \sup |A\mathbf{x}|$  where  $|\mathbf{x}| = 1$ . (Def 2.9.6) Show  $|A\mathbf{b}| \leq \|A\| |\mathbf{b}|$

3) Apply Theorem 3.1.10 to determine for what  $c$  does the equation  $x^4 + 2x^2 + y^3 - 3y = c$  determine a smooth manifold.

4)