**MANE 6520 - Fluid Mechanics, Fall 2023**

***Homework #1*** - Thurs 7 Sept; due Thurs 14 Sept 2023

Be precise about your notation.

1. For ,  find  by three methods: term-by-term, resolving the determinant , and using the permutation symbol: ; ,

all others = 0

1. For a tensor represented in Cartesian matrix form as

, and a scalar 

1. Find the gradient of *d*, 
2. Find the magnitude of  , 
3. Find the divergeance of **a**, 
4. Find the gradient of **a**, 
5. Find 
6. Find the double dot product  
7. Consider the function  (in 2-D).
8. Plot curves of for 
9. Consider now the  curve to represent the edge of a body. Find the outward normal unit vectors and at *x* = 0 and L/2.
10. Consider a 2-D stress tensor . Find the stress (traction) vectors and at and .