**Class 15** – **Sparse Matrix, Stimulus-Response (Chp. 11)**

ChE310\_Sec1\_F2019 / 10.15.19

<http://www.reuelgroup.org/numerical-methods-che-310.html>

Announcements:

* Nov 12, Phase II of project is due.

**Warm Up Group Activity:** submit to Jared by **2:20 pm**.

Solve the following system of equations w/ *two* different methods.



**Outline for Class 15 Lecture**

1. Compare and review **\**, LU decomp, and **tridiag**, also show how to setup a finite element prob.





1. Matrix Inverse 



Practical application = computer graphics

* 1. Calculating inverse (2x2, easy)



* 1. Calculating 3x3 or higher, not easy [slide]
1. Stimulus Response – a very practical, engineering use of the matrix inverse. Takes a little mind bending to get used to it.





1. Example of the terrible restaurant [slides]
2. Ill-conditioned system and inverted matrix



1. Norm, way to report magnitude of a matrix



Other norms (e.g. column or row sum norm) see book

Cond[A] = matrix condition number



Can be used to determine the **precision** of the solution to a system of linear equations. If inputs are known to 10^-t precision and Cond[A] = 10^c, then precision of solution is 10^c-t. Matlab has **norm** and **cond** built in.

