

Homework Set 6. Due Friday October 14 at 10.30 am

1. Consider the matrix

$$A = \begin{pmatrix} 9 & -3 & -5 \\ -3 & 11 & 0 \\ 2 & 6 & 20 \end{pmatrix}. \quad (1)$$

- a) Try to diagonalize this matrix by Mathematica and find the eigenvalues and eigenvectors. What is your interpretation?
- b) Is this matrix diagonalizable? Find the minimum order polynomial satisfied by this matrix. What are the roots? What do you conclude?
- c) Bring this matrix in the Jordan canonical form by a similarity transformation..

2. Consider the sequence of functions

$$f_n(x) = x + x^2/n \quad (2)$$

on the real axis.

- a) Does this sequence converge uniformly to $f(x) = x$?
 - b) If we restrict the domain of this function to $[-2,2]$, show that the convergence is uniform.
 - c) Is this sequence a Cauchy sequence? Why?
3. If $f_n(x) \rightarrow f(x)$ uniformly on $[a, b]$ for $n \rightarrow \infty$, show that you can interchange the limit and the integral.