MA 35100

Supplemental Homework - Do Not Submit

1. Page 279: T/F Questions - #5.1, 5.2, 5.5, 5.6.

2. Page 279: #5.1(a)(b), 5.5(e).

3. If $A = \begin{bmatrix} 1 & -1 \\ 2 & 4 \end{bmatrix}$.

(a) Find all eigenvalues of A and corresponding eigenvectors for each eigenvalue.

(b) Compute $A^2 - 5A + 6I$ and $A^4 - 5A^3 + 6A^2$.

(c) Show that $A^{-1} = -\frac{1}{6}A + \frac{5}{6}I$.

(d) Find an eigenbasis $\mathcal{B}_e$ for $\mathbb{R}^2$.

(e) Compute A^{1000}.

4. Page 290: #5.29(a)(f)(g).

5. If $\lambda_1, \lambda_2, \lambda_3, \lambda_4$ are the eigenvalues of the 4×4 matrix $\begin{bmatrix} -3 & 13 & 8 & 33 \\ -1 & 5 & -2 & 6 \\ 17 & 12 & 0 & 25 \\ 11 & -9 & -79 & 5 \end{bmatrix}$,

find $\lambda_1 + \lambda_2 + \lambda_3 + \lambda_4$.

6. Find two linearly independent (vector-valued) solutions $\mathbf{x}^{(1)}(t)$ and $\mathbf{x}^{(2)}(t)$ to the following linear system of ordinary differential equations

$$\mathbf{x}'(t) = \begin{bmatrix} 1 & -1 \\ 2 & 4 \end{bmatrix} \mathbf{x}(t)\,.$$