MATH 3A − APPLICATIONS OF DIAGONALIZATION

Here are some extra suggested problems related to the applications of diagonalization.

Problem 1: Let A be the matrix

$$A = \begin{bmatrix} 5 & 4 \\ 4 & 5 \end{bmatrix}$$

(a) Find D and P such that $A = PDP^{-1}$

(b) Calculate $\sqrt{A}$

Hint: $\sqrt{A} = A^{\frac{1}{2}}$. Also, you can find solutions at the end of the $\mathcal{B}$ matrix lecture notes (Lecture 20), as well as under the following link: Matrix Square root

(c) Calculate e^A

Hint: Same thing, but replace $\sqrt{\cdot}$ by e. You can find a similar solution on Matrix Exponential

(d) Calculate $\cos(A)$

Hint: Same thing, but replace e with $\cos$. You can find a similar solution on $\cos$ of matrix

Of course, you can calculate other fun things, like $\ln(A)$, $\tan^{-1}(A)$, basically whatever you want :)

Problem 2: Suppose F_n satisfies $F_{n+1} = 5F_n - 6F_{n-1}$ with $F_0 = 2$ and $F_1 = 5$. Find a formula for F_n. I believe the answer is $F_n = 2^n + 3^n$.

Problems 3 and 4: Check out Problem 10 on the Peyam 1 and Peyam 2 Final Exams on my webpage (which were the finals I gave out last winter)

Date: Friday, November 15, 2019.