



Department of Mathematics and Natural Sciences

MAT 350

## ONLINE ASSIGNMENT 4

FALL 2023

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You have to submit the assignment in a single *nb* file using [this form](#).  
Submission Deadline: 11:59 PM, Dec 10, 2023

1. Consider the matrix  $A = \begin{pmatrix} 0 & 0 & -2 \\ 1 & 2 & 1 \\ 1 & 0 & 3 \end{pmatrix}$ . Check if  $A$  is diagonalizable using RowReduce command. If it is diagonalizable, Find a matrix  $P$  that diagonalizes  $A$ . Finally, verify if  $A$  is diagonalized by this  $P$  by evaluating  $P^{-1}AP$ .
2. Apply the Gram-Schmidt process on the set of basis vectors  $\{u_1, u_2, u_3\}$ , where  $u_1 = (1, 1, 1)$ ,  $u_2 = (0, 1, 1)$  and  $u_3 = (0, 0, 1)$ . Hence find the  $QR$  decomposition of  $A = [u_1|u_2|u_3]$ .
3. Find a matrix  $S$  that orthogonally diagonalizes  $B = \begin{pmatrix} 4 & 2 & 2 \\ 2 & 4 & 2 \\ 2 & 2 & 4 \end{pmatrix}$ . Then verify if  $B$  is orthogonally diagonalized by this  $S$  by evaluating  $S^TAS$ .