SUMMARY OF SECTION 7.2

A SQUARE MATRIX A IS SAID TO BE <u>DIAGONALIZABLE</u> IF THERE IS AN INVERTIBLE MATRIX P SUCH THAT $P^{-1}AP$ IS DIAGONAL; THE MATRIX P IS SAID TO DIAGONALIZE A.

<u>THM 1</u> – AN $N \times N$ MATRIX A IS DIAGONALIZABLE IF AND ONLY IF A HAS N EIGENVECTORS $\vec{P}_1, \vec{P}_2, \ldots, \vec{P}_N$ SO THAT

$[\vec{P}_1 \mid \vec{P}_2 \mid \cdots \mid \vec{P}_N]$ IS INVERTIBLE.

NOTE: THE MATRIX $[\vec{P}_1 \mid \vec{P}_2 \mid \cdots \mid \vec{P}_N]$ WILL DIAGONALIZE A.

<u>THM 3</u> – IF AN $N \times N$ MATRIX A HAS N DISTINCT EIGENVALUES $\lambda_1, \lambda_2, \ldots, \lambda_N$, THEN THE MATRIX OF CORRESPONDING EIGENVECTORS $[\vec{P}_1 \mid \vec{P}_2 \mid \cdots \mid \vec{P}_N]$ IS INVERTIBLE.

NOTE: THM 2 & THM 4 DEAL WITH NOTATION FROM CH 5 & CH 6 AND ARE NOT NECESSARY FOR OUR PURPOSES.

COMPUTATIONAL TOOL $\longrightarrow$ IF $P^{-1}AP = D$ IS DIAGONAL, THEN $A^k = PD^kP^{-1}$ FOR ALL POSITIVE INTEGERS k.

FACT: AN $N \times N$ MATRIX A IS <u>NOT</u> DIAGONALIZABLE $\Leftrightarrow$ THE TOTAL NUMBER OF PARAMETERS NEEDED TO DESCRIBE ITS EIGEN VECTORS IS LESS THAN N.