Name:_____

M511: Linear Algebra (Spring 2018)
Instructor: Justin Ryan
Good Problems 13: Sections 6.1 and 6.2

Instructions *Complete all problems, showing enough work. A selection of problems will be graded based on the organization and clarity of the work shown in addition to the final solution (provided one exists).*

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1. Find the eigenvalues and bases for the eigenspaces of the matrix.

$$A = \begin{pmatrix} 3 & 2 \\ 3 & -2 \end{pmatrix}$$

2. Find the eigenvalues and bases for the eigenspaces of the matrix.

$$A = \begin{pmatrix} 2 & -3 & 1 \\ 1 & -2 & 1 \\ 1 & -3 & 2 \end{pmatrix}$$

3. Consider the matrices T, S, and $A = S^{-1}TS$. Show that T and A have the same eigenvalues. What can you say about the corresponding eigenvectors?

$$T = \begin{pmatrix} 2 & 1 \\ 0 & 3 \end{pmatrix}, \quad S = \begin{pmatrix} 5 & 3 \\ 3 & 2 \end{pmatrix}$$

4. Use the power series for e^x centered at $x_0 = 0$ to deduce that

$$e^{i\theta} = \cos\theta + i\sin\theta.$$

What does $e^{i\pi}$ equal?