Name:_____
M511: Linear Algebra (Spring 2018)
Instructor: Justin Ryan
Good Problems 14: Chapter 6

WICHITA STATE UNIVERSITY

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 general solution of the system of differential equations.

$$\begin{cases} y_1' = 2y_1 - 6y_3 \\ y_2' = y_1 - 3y_3 \\ y_3' = y_2 - 2y_3 \end{cases}$$

2. Solve the initial value problem.

$$\begin{cases} y_1' = 2y_1 - 6y_3 \\ y_2' = y_1 - 3y_3 \\ y_3' = y_2 - 2y_3, \\ y_1(0) = y_2(0) = y_3(0) = 2 \end{cases}$$

3. Find the general solution of the system of second order differential equations by reducing it to a system of twice as many first order differential equations.

$$\begin{cases} y_1'' = -2y_2 \\ y_2'' = y_1 + 3y_2 \end{cases}$$

4. Factor the matrix A into a product $A = XDX^{-1}$ where D is diagonal.

$$A = \begin{pmatrix} 1 & 0 & 0 \\ -2 & 1 & 3 \\ 1 & 1 & -1 \end{pmatrix}$$

Use this factorization to compute e^A.

5. Use the definition of the exponential of a matrix to compute e^A for

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