

Additional Homework 8  
Due March 24

1. Solve the following systems by using eigenvalues and eigenvectors:

(a)  $x' = x, \quad y' = 2x + 3y;$

(b)  $x' = x + 2y + 3z, \quad y' = 2y + z, \quad z' = z.$

2. Prove that if  $\lambda$  and  $\mathbf{v}$  are an eigenvalue, respectively, an eigenvector for the matrix  $\mathbf{A}$ , then  $\mathbf{x}(t) = e^{\lambda t} \mathbf{v}$  is a solution for the system  $\mathbf{x}' = \mathbf{A}\mathbf{x}$ .

3. Use the eigenvalue method to solve:

$$\mathbf{x}' = \begin{bmatrix} a & 0 \\ 0 & b \end{bmatrix} \mathbf{x},$$

for all real numbers  $a$  and  $b$ . Do the eigenvectors depend on  $a$  and  $b$ ?