Student ID: KEY

Student Name: SOLUTION

Serial Number: _____

Math 202, Section 3 and 4
Spring 2015, Term 142

Quiz 5
Version A and B

Instructions: Show Your Work!

(10^{pts}) **1.** Consider the linear system

$$\begin{aligned} \frac{dx}{dt} &= -x + 6y \\ \frac{dy}{dt} &= y \\ \frac{dz}{dt} &= -3x + 9y + 2z \end{aligned}$$

(a) (3 pts) Write the above linear system in matrix form, i.e. as

$$X' = AX.$$

(b) (4 pts) Find the eigenvalues and eigenvectors of A.

(c) (3 pts) Show that the set $\{K_1 e^{\lambda_1 t}, K_2 e^{\lambda_2 t}, K_3 e^{\lambda_3 t}\}$ is linearly independent, where K_i is an eigenvector corresponding to the eigenvalue λ_i $(i = 1, 2, 3)$ calculated in Part (b).