Assignment #4

Due on Friday, February 6, 2015

Read Chapter 3 on *Solving Linear Systems* in the class lecture notes at
`http://pages.pomona.edu/~ajr04747/`

Read Section 2.2, on *The Geometry of Systems,* in Blanchard, Devaney and Hall.

Do the following problems

1. Explain why the following linear system of differential equations cannot be put in diagonal form.
$$\begin{cases} \dfrac{dx}{dt} & = & 2x + y; \\[2mm] \dfrac{dy}{dt} & = & -x + 4y. \end{cases}$$

2. Explain why the following linear system of differential equations cannot be put in diagonal form.
$$\begin{cases} \dfrac{dx}{dt} & = & ay; \\[2mm] \dfrac{dy}{dt} & = & -bx, \end{cases}$$
where a and b are positive constants

3. Explain why the following linear system of differential equations cannot be put in diagonal form.
$$\begin{cases} \dfrac{dx}{dt} & = & -2x - 3y; \\[2mm] \dfrac{dy}{dt} & = & 3x - 2y. \end{cases}$$

4. Determine whether or not the linear system

$$
\begin{cases}
\dfrac{dx}{dt} &=& y; \\[2ex]
\dfrac{dy}{dt} &=& 8x - 2y
\end{cases}
$$

can be put in diagonal form. If so, give the general solution to the system and sketch the phase portrait.

5. Determine whether or not the linear system

$$
\begin{cases}
\dfrac{dx}{dt} &=& -3x + 2y; \\[2ex]
\dfrac{dy}{dt} &=& 4x - 5y
\end{cases}
$$

can be put in diagonal form. If so, give the general solution to the system and sketch the phase portrait.