In Mathematica, you will use the following commands:

a. To enter the values into a matrix:
   
   \[ A = \begin{pmatrix} 2 & 2 \\ -4 & 6 \end{pmatrix} \]

b. To view A in a nice matrix shape so you can double check that you entered the correct values:
   
   \( \text{MatrixForm}[A] \)

c. To calculate the eigenvalues of A:
   
   \( \text{Eigenvalues}[A] \)

d. To calculate eigenvectors of A:
   
   \( \text{Eigenvectors}[A] \)

Homework Information:

Sect. 21. #8(do B and D)- this means do parts (a), (b) and (c) but only for the curves that start at points B and D.

#15. The book gives a hint on one way to do this problem. Here is another way.

I. First consider the simplified uncoupled version of the equations:

\[
\begin{align*}
\frac{dx}{dt} &= 0.3x \\
\frac{dy}{dt} &= -0.1y
\end{align*}
\]

\[
\begin{align*}
\frac{dx}{dt} &= 0.3x \\
\frac{dy}{dt} &= -2y
\end{align*}
\]

In which case does not being able to eat any prey have a bigger effect on decreasing the population of the predator? Which would correspond to the lethargic predator and which to the active predator?
II. Now add on coupling but only focus on the one new term added to the predator equation:

\[ \begin{align*}
\frac{dx}{dt} &= 0.3x & \frac{dx}{dt} &= 0.3x \\
\frac{dy}{dt} &= -0.1y + 2xy & \frac{dy}{dt} &= -2y + 0.1xy
\end{align*} \]

Assume that the values of \( x \) and \( y \) are the same. In which equation will a single predator-prey interaction (accounted for by the term involving \( xy \)) make a bigger contribution to sustaining the population of predators? How would this relate to the lethargic predator and the active predator?

III. Now consider the term that takes account of the effect on the prey of coupling:

\[ \begin{align*}
\frac{dx}{dt} &= 0.3x - 0.1xy & \frac{dx}{dt} &= 0.3x - 3xy \\
\frac{dy}{dt} &= -0.1y & \frac{dy}{dt} &= -2y
\end{align*} \]

In which equation, is a meeting between a predator and a prey more likely to lead to a decrease in the population of the prey? How would this relate to the lethargic predator and to the active predator?