Quiz 10, Math 246, Professor David Levermore
Tuesday, 27 November 2018

Your Name:

Discussion Instructor (circle one):   Sid Sharma   Anqi Ye
Discussion Time (circle one):   8:00   9:00   10:00

No books, notes, calculators, or any electronic devices.
Show your reasoning for full credit. Good luck!

(1) [5] The eigenpairs of a 2×2 matrix $\mathbf{B}$ are

$$\left(-3, \begin{pmatrix} 1 \\ 4 \end{pmatrix}\right), \qquad \left(-1, \begin{pmatrix} 4 \\ 1 \end{pmatrix}\right).$$

     (a) [2] Classify the phase-plane portrait of the system $\mathbf{x}' = \mathbf{Bx}$.
     (b) [2] Sketch the phase-plane portrait of the system $\mathbf{x}' = \mathbf{Bx}$.
     (c) [1] Determine the stability of the origin for the system $\mathbf{x}' = \mathbf{Bx}$.

(2) [5] Consider the planar system

$$\mathbf{x}' = \mathbf{Cx}, \qquad \text{where} \quad \mathbf{C} = \begin{pmatrix} 3 & 2 \\ -4 & -1 \end{pmatrix}.$$

     (a) [2] Classify its phase-plane portrait.
     (b) [2] Sketch its phase-plane portrait.
     (c) [1] Determine the stability of the origin for this system.