HOMEWORK 7: Math 265 Leah Keshet Due by 5:00PM on Nov 22
You can submit in class or in my office, Math Anex 1111

This is most of HW7. I may add a few more small problems. Check back later for the final version.

New Problems:

(A) Solve the following systems of linear ordinary differential equations with the given initial conditions.

1. $\dfrac{d\vec{\mathbf{x}}(t)}{dt} = \begin{pmatrix} 6 & -1 \\ 5 & 4 \end{pmatrix} \vec{\mathbf{x}}(t), \quad \mathbf{x}(0) = \begin{pmatrix} 1 \\ 0 \end{pmatrix}.$

2. $\dfrac{d\vec{\mathbf{x}}(t)}{dt} = \begin{pmatrix} 1 & 3 \\ 5 & 3 \end{pmatrix} \vec{\mathbf{x}}(t), \quad \mathbf{x}(0) = \begin{pmatrix} 0 \\ 1 \end{pmatrix}.$

3. $\dfrac{d\vec{\mathbf{x}}(t)}{dt} = \begin{pmatrix} 2 & 3 \\ 2 & 1 \end{pmatrix} \vec{\mathbf{x}}(t), \quad \mathbf{x}(0) = \begin{pmatrix} 1 \\ 1 \end{pmatrix}.$

4. $\dfrac{d\vec{\mathbf{x}}(t)}{dt} = \begin{pmatrix} 2 & 8 \\ -1 & -2 \end{pmatrix} \vec{\mathbf{x}}(t), \quad \mathbf{x}(0) = \begin{pmatrix} 1 \\ 0 \end{pmatrix}.$

5. $\dfrac{d\vec{\mathbf{x}}(t)}{dt} = \begin{pmatrix} 1 & 3 \\ 0 & 2 \end{pmatrix} \vec{\mathbf{x}}(t), \quad \mathbf{x}(0) = \begin{pmatrix} -1 \\ 1 \end{pmatrix}.$

(B) For each of the problems in (A), sketch the behaviour of the family of solution trajectories in the xy phase plane from arbitrary initial conditions. If the eigenvectors are real, you should display them on your graph and show the solutions that either approach or escape from the origin along those directions.

Review Problems:

Download a copy of the 2nd midterm test and work through each problem that you had trouble with on the test. Hand in your corrections.