MATH 22: Homework 8

[Due Nov 9th]

Written homework is intended to help students develop their communication and exposition skills through complete write-ups. While correctness of the solution is, of course, necessary, much of the grade for the problem is dependent on clear and appropriate exposition. Exposition shall be appropriate for the type and level of the problem. One principle we use is that exposition should be detailed around the main aspects of the problem, but terse exposition is appropriate for subsidiary parts of a problem.

1. problem 6.1.2

2. 6.1.5

3. 6.1.16

4. 6.2.2

5. 6.2.5

6. 6.2.14, find at least two entries you can change.

7. Let $\vec{v}$ and $\vec{w}$ be eigenvectors of A. If $\vec{v} + \vec{w}$, then what must be true of the eigenvalues?

8. The matrix P has eigenvalues 0, 1, and 1, corresponding to eigenvectors $\begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$, $\begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}$, and $\begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix}$. The matrix Q has the same eigenvalues but corresponding to eigenvectors $\begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$, $\begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$, and $\begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$. Use the diagonal formula $A = S\Lambda S^{-1}$ to find P and Q, what do you notice, and why might this be?

9. If $\vec{v}$ is en eigenvector of A and of B, must it be an eigenvector of AB?

Optional Practice:

6.1: 3, 6, 8, and 11

6.2: 3,4,9, and 12