Reading Questions 17

1. If A and B are similar then the matrix A is diagonalizable.
2. All diagonal matrices are diagonalizable.
3. If $\{\vec{v}_2, \ldots, \vec{v}_n\}$ is an eigenbasis for the matrix A then the matrix $\begin{bmatrix} \vec{v}_1 \cdots \vec{v}_n \end{bmatrix}$ is invertible.
4. If $S^{-1}AS = B$ for some invertible S and diagonal B what can you say about the columns of S?

Section 7.1 Diagonalization (Part 1)

Eigenvalues and Eigenvectors

P 1. Write down what it means for the vector $\vec{v}$ to be an eigenvector of the matrix A.

P 2. If the vector $\vec{v}$ is an eigenvector for the matrix A is $\vec{v}$ an eigenvector for the matrix kA for some nonzero constant k? Explain your answer.

P 3. Does there exist an invertible matrix S and a diagonal matrix B such that $AS = SB$ where A is the linear transformation which rotates a vector $180°$ in $\mathbb{R}^2$? Explain your answer.

P 4. If $\begin{bmatrix} 1 \\ -1 \\ -1 \end{bmatrix}$ is an eigenvector of the matrix $\begin{bmatrix} 4 & 1 & 1 \\ -5 & 0 & -3 \\ -1 & -1 & 2 \end{bmatrix}$ what is its eigenvalue?

P 5. Let $\vec{v}$ be an eigenvector for A. Is $\vec{v}$ an eigenvector for A^3? If so what are the eigenvalues?

P 6. Let $\vec{v}$ be an eigenvector for A. Is $\vec{v}$ an eigenvector for $A+\sigma I$? If so what are the eigenvalues?