1 Bucket O' Ye Olde Troo/False

1)Every linear transformation on $\mathbb{R}^n$ has distinct eigenvalues.

2) If a real matrix has one eigenvector, then it has an infinite number of eigenvectors.

3) There exists a square matrix with no real eigenvectors.

4) Eigenvalues must be non-zero scalars.

5) Any two eigenvectors are linearly independent.

6) The sum of two eigenvalues of a linear transformation T is also an eigenvalue of T.

7) Similar matrices have the same eigenvalues.

8) If A and B are similar matrices, λ is an eigenvalue for A with eigenspace A_λ and λ is an eigenvalue for B with eigenspace B_λ, then $\dim A_\lambda = \dim B_\lambda$.

9) Similar matrices have the same eigenvectors.

10) The sum of two eigenvectors of a linear tranformation T is always an eigenvector.

11) Any linear transformation on $\mathbb{R}^n$ that has fewer than n distinct eigenvalues is not diagonalizable.

12) Eigenvectors corresponding to the same eigenvalue are always linearly dependent.

13) If λ is an eigenvalue of T, then each element of E_λ is an eigenvector of T.

14) If λ_1, λ_2 are distinct eigenvalues of T, then $E_{\lambda_1} \cap E_{\lambda_2} = \{\overrightarrow{0}\}$.

15) Let A be a n×n matrix. Let $\beta = \{\overrightarrow{v}_1, ..., \overrightarrow{v}_n\}$ be a basis for $\mathbb{R}^n$ consisting of eigenvectors of A. If

$$Q = \begin{bmatrix} | & & | \\ \overrightarrow{v}_1 & \cdots & \overrightarrow{v}_n \\ | & & | \end{bmatrix}$$

then $Q^{-1}AQ$ is a diagonal matrix.

16)Let A be a n×n matrix. Let $\beta = \{\overrightarrow{v}_1, ..., \overrightarrow{v}_n\}$ be a basis for $\mathbb{R}^n$ consisting of eigenvectors of A. If

$$Q = \begin{bmatrix} | & & | \\ \overrightarrow{v}_1 & \cdots & \overrightarrow{v}_n \\ | & & | \end{bmatrix}$$

then QAQ^{-1} is a diagonal matrix.