Name:

1. Answer the following statements "true" or "false." Throughout this problem, let A and B both be $n \times n$ matrices.

   (a) Let A be similar to B. Then $rk(A) = rk(B)$.

   (b) Let A be similar to B, and suppose 2 is one of the eigenvalues of A. Then 2 is also one of the eigenvalues of B.

   (c) Let 3 be one of the eigenvalues of A. Then 9 is one of the eigenvalues of A^2.

2. Find matrices S and Λ such that Λ is a diagonal matrix and $A = S\Lambda S^{-1}$.

$$A = \begin{pmatrix} 3 & 1 \\ 2 & 2 \end{pmatrix}$$