

Name:

1. Answer the following statements “true” or “false.” For both statements,  $A$  and  $B$  are  $3 \times 3$  matrices, each having 2 as one of their eigenvalues.

(a) One of the eigenvalues of  $A^2$  is 4.

(b) One of the eigenvalues of  $AB$  is 4.

2. Consider the following matrix.

$$A = \begin{pmatrix} 1 + \epsilon & -1 - \epsilon \\ 1 & -1 \end{pmatrix}$$

(a) Assume  $\epsilon \neq 0$ . Find all eigenvalues and eigenvectors in terms of  $\epsilon$ .

(b) Now let  $\epsilon = 0$ . Find all eigenvalues and eigenvectors.