

# Linear Algebra

**Instructions** Please write your name in the upper right-hand corner of the page. Use complete sentences, along with any necessary supporting calculations, to answer the following questions.

1. Find a  $2 \times 2$  matrix  $A$  that has the vectors  $\begin{pmatrix} 1 \\ 0 \end{pmatrix}$  and  $\begin{pmatrix} 2 \\ 1 \end{pmatrix}$  as eigenvectors with corresponding eigenvalues 3 and 4.

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2. If a  $2 \times 2$  matrix  $A$  has the numbers 1 and 3 as eigenvalues, and a  $2 \times 2$  matrix  $B$  has the numbers 1 and 4 as eigenvalues, must the product matrix  $AB$  have the numbers 1 and 12 as eigenvalues? Explain why or why not.