

# 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 all values of  $t$  for which

$$\det \begin{pmatrix} 0 & 0 & 0 & t \\ 1 & 0 & t & * \\ 0 & 2 & 0 & * \\ 1 & * & 3 & * \end{pmatrix} = 0.$$

(The asterisks represent unspecified numbers that you do not need to know to solve the problem.)

**Linear Algebra**

2. Fill in the three indicated matrix entries in the following equation that expresses a certain matrix as the product of a lower triangular matrix times an upper triangular matrix:

$$\begin{pmatrix} 1 & 7 & * \\ 3 & 23 & * \\ 0 & 8 & * \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 \\ \square & 1 & 0 \\ \square & \square & 1 \end{pmatrix} \begin{pmatrix} * & * & * \\ 0 & * & * \\ 0 & 0 & * \end{pmatrix}$$

(The asterisks represent unspecified numbers that you do not need to know to solve the problem.)