

**Linear Algebra**

1. If  $A = \begin{pmatrix} 1 & 0 & 2 \\ 5 & 3 & 10 \\ 0 & 18 & 4 \end{pmatrix}$ , find a lower-triangular matrix  $L$  and an upper-triangular matrix  $U$  such that  $A = LU$ .

2. Find the value of  $a$  for which  $\det \begin{pmatrix} 1 & 2 & 3 & 4 \\ 0 & 1 & 5 & 6 \\ 0 & 0 & 1 & 7 \\ 1 & 0 & 0 & a \end{pmatrix} = 0$ .