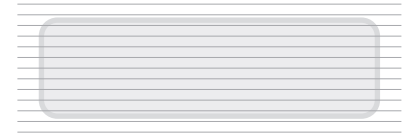




Test 1

Name \_\_\_\_\_ Uni \_\_\_\_\_



[1] Find the determinant of the matrix

$$A = \begin{bmatrix} 0 & 1 & 1 & 1 & 1 \\ 0 & 1 & 3 & 3 & 3 \\ 0 & 1 & 1 & 5 & 5 \\ 2 & 2 & 2 & 2 & 2 \\ 0 & 1 & 1 & 1 & 7 \end{bmatrix}$$

$\det(A) =$



Test 1

[2] Find the inverse to the matrix

$$A = \begin{bmatrix} 1 & 3 & 2 \\ 2 & 2 & 3 \\ 0 & 1 & 1 \end{bmatrix}$$

$$A^{-1} = \frac{1}{\square} \begin{bmatrix} \square & \square & \square \\ \square & \square & \square \\ \square & \square & \square \end{bmatrix}$$



Test 1

[3] Using Cramer's rule, solve for  $x$  in the system of equations

$$\begin{bmatrix} 1 & a & 0 \\ 2 & b & 1 \\ 4 & c & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 5 \end{bmatrix}$$

$$x = \frac{(\square) a + (\square) b + (\square) c}{(\square) a + (\square) b + (\square) c}$$



Test 1

[4] Find a system of eigenvalues and eigenvectors for the matrix  $A$ , and find a formula for  $A^n$ , where

$$A = \begin{bmatrix} 3 & 1 \\ 4 & 6 \end{bmatrix}$$

$\lambda_1, \lambda_2 =$ <input style="width: 40px; height: 20px; border: 1px dotted black;" type="text"/> , <input style="width: 40px; height: 20px; border: 1px dotted black;" type="text"/>
$v_1, v_2 =$ $\begin{bmatrix} \text{ \\ \text{} \end{bmatrix}, \begin{bmatrix} \text{ \\ \text{} \end{bmatrix}$
$A^n = \frac{\text{}}{\text{}} \begin{bmatrix} \text{} & \text{} \\ \text{} & \text{} \end{bmatrix} + \frac{\text{}}{\text{}} \begin{bmatrix} \text{} & \text{} \\ \text{} & \text{} \end{bmatrix}$



Test 1

[5] Let  $f(n)$  be the determinant of the  $n \times n$  matrix in the sequence

$$\begin{bmatrix} \phantom{0} \end{bmatrix} \quad \begin{bmatrix} 1 \end{bmatrix} \quad \begin{bmatrix} 1 & -1 \\ 2 & 1 \end{bmatrix} \quad \begin{bmatrix} 1 & -1 & 0 \\ 2 & 1 & -1 \\ 0 & 2 & 1 \end{bmatrix} \quad \begin{bmatrix} 1 & -1 & 0 & 0 \\ 2 & 1 & -1 & 0 \\ 0 & 2 & 1 & -1 \\ 0 & 0 & 2 & 1 \end{bmatrix} \quad \begin{bmatrix} 1 & -1 & 0 & 0 & 0 \\ 2 & 1 & -1 & 0 & 0 \\ 0 & 2 & 1 & -1 & 0 \\ 0 & 0 & 2 & 1 & -1 \\ 0 & 0 & 0 & 2 & 1 \end{bmatrix}$$

Find a recurrence relation for  $f(n)$ . Express  $f(n)$  using a matrix power. Find a formula for  $f(n)$ .

$$\begin{aligned} f(n) &= (\boxed{\phantom{0}}) f(n-1) + (\boxed{\phantom{0}}) f(n-2) \\ \begin{bmatrix} f(n) \\ f(n+1) \end{bmatrix} &= \begin{bmatrix} \boxed{\phantom{0}} & \boxed{\phantom{0}} \\ \boxed{\phantom{0}} & \boxed{\phantom{0}} \end{bmatrix}^n \begin{bmatrix} f(0) \\ f(1) \end{bmatrix} \\ f(n) &= \end{aligned}$$