F16 10:10 Exam 2 Problem 1
Linear Algebra, Dave Bayer

test1b2p1

[Reserved for Score]

Test 1

Name _____ Uni _____

[1] Find the determinant of the matrix

$$A = \begin{bmatrix} 1 & 1 & 5 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 \\ 0 & 3 & 0 & 0 & 0 \\ 1 & 1 & 1 & 3 & 1 \\ 1 & 1 & 1 & 1 & 4 \end{bmatrix}$$

$\det(A) =$

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Test 1

[2] Find the inverse to the matrix

$$A = \begin{bmatrix} 2 & 3 & 4 \\ 3 & 2 & 1 \\ 1 & 1 & 0 \end{bmatrix}$$

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

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Test 1

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

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

$$y = \frac{\left(\quad\right) a + \left(\quad\right) b + \left(\quad\right) c}{\left(\quad\right) a + \left(\quad\right) b + \left(\quad\right) c}$$

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Test 1

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

$$A = \begin{bmatrix} 4 & 1 \\ 2 & 5 \end{bmatrix}$$

$$\lambda_1,\ \lambda_2 = \square,\ \square$$

$$v_1,\ v_2 = \begin{bmatrix} \square \\ \square \end{bmatrix}, \begin{bmatrix} \square \\ \square \end{bmatrix}$$

$$A^n = \frac{\square}{\square}\begin{bmatrix} \square & \square \\ \square & \square \end{bmatrix} + \frac{\square}{\square}\begin{bmatrix} \square & \square \\ \square & \square \end{bmatrix}$$

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Test 1

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

$$[\,] \qquad \begin{bmatrix} 4 \end{bmatrix} \qquad \begin{bmatrix} 4 & 1 \\ 3 & 4 \end{bmatrix} \qquad \begin{bmatrix} 4 & 1 & 0 \\ 3 & 4 & 1 \\ 0 & 3 & 4 \end{bmatrix} \qquad \begin{bmatrix} 4 & 1 & 0 & 0 \\ 3 & 4 & 1 & 0 \\ 0 & 3 & 4 & 1 \\ 0 & 0 & 3 & 4 \end{bmatrix} \qquad \begin{bmatrix} 4 & 1 & 0 & 0 & 0 \\ 3 & 4 & 1 & 0 & 0 \\ 0 & 3 & 4 & 1 & 0 \\ 0 & 0 & 3 & 4 & 1 \\ 0 & 0 & 0 & 3 & 4 \end{bmatrix}$$

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

$$f(n) = \left(\quad\right) f(n-1) + \left(\quad\right) f(n-2)$$

$$\begin{bmatrix} f(n) \\ f(n+1) \end{bmatrix} = \begin{bmatrix} & \\ & \end{bmatrix}^n \begin{bmatrix} f(0) \\ f(1) \end{bmatrix}$$

$$f(n) =$$