[1] Find the determinant of the matrix

$$A = \begin{bmatrix} 1 & 1 & 0 & 2 \\ 3 & 4 & 1 & 5 \\ 1 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 \end{bmatrix}$$

det(A) =

[2] Find the determinant of the matrix

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

det(A)	=	
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[3] Find the inverse of the matrix

$$A = \begin{bmatrix} 1 & 0 & 2 \\ 1 & 2 & -1 \\ 1 & -1 & 0 \end{bmatrix}$$
$$A^{-1} = \frac{1}{2} \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

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

$$\begin{bmatrix} 3 & 1 & a \\ 2 & 1 & b \\ 1 & 1 & c \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 5 \\ 5 \\ 2 \end{bmatrix}$$

$$x = \frac{\left(\bigcirc \right) a + \left(\bigcirc \right) b + \left(\bigcirc \right) c}{\left(\bigcirc \right) a + \left(\bigcirc \right) b + \left(\bigcirc \right) c}$$

[5] Find the characteristic equation and a system of eigenvalues and eigenvectors for the matrix

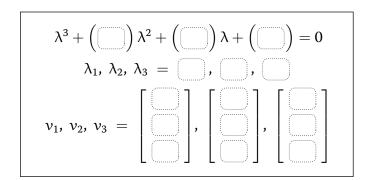
$$A = \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$$

$$\lambda^{2} + \left(\bigcirc \right) \lambda + \left(\bigcirc \right) = 0$$

 $\lambda_{1}, \lambda_{2} = \bigcirc, \bigcirc$
 $u_{1}, v_{2} = \left[\bigcirc \right], \left[\bigcirc \right]$

[6] Find the characteristic equation and a system of eigenvalues and eigenvectors for the matrix

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



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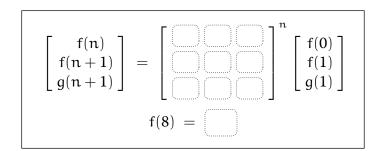
[7] Express f(n) using a matrix power, and find f(8), where

$$\begin{split} f(0) &= 1, \quad f(1) = 2 \\ f(n) &= 2 \, f(n-1) \, - \, f(n-2) \end{split}$$

$$\begin{bmatrix} f(n) \\ f(n+1) \end{bmatrix} = \begin{bmatrix} & & \\ & & \\ & & \\ & & \\ & & \\ f(8) \end{bmatrix}^{n} \begin{bmatrix} f(0) \\ f(1) \end{bmatrix}$$

[8] Express f(n) using a matrix power, and find f(8), where

$$\begin{array}{ll} f(0)=1, & f(1)=1, & g(1)=2 \\ f(n) & = f(n-1) \ + \ g(n-1) \ + \ f(n-2) \\ g(n) & = \ f(n-1) \ - \ g(n-1) \ + \ f(n-2) \end{array}$$



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

$\begin{bmatrix} 1 \end{bmatrix} \begin{bmatrix} 1 \end{bmatrix} \begin{bmatrix} 1 & 2 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} 1 & 2 & 0 \\ 1 & 1 & 2 \\ 0 & 1 & 1 \end{bmatrix} \begin{bmatrix} 1 & 2 & 0 & 0 \\ 1 & 1 & 2 & 0 \\ 0 & 1 & 1 & 2 \\ 0 & 0 & 1 & 1 \end{bmatrix} \begin{bmatrix} 1 & 2 & 0 & 0 \\ 1 & 1 & 2 & 0 \\ 0 & 1 & 1 & 2 \\ 0 & 0 & 1 & 1 \end{bmatrix} \begin{bmatrix} 1 & 2 \\ 1 & 1 \\ 0 & 1 \\ 0 & 0 \\ 0 & 0 \end{bmatrix}$	2 1 1	0 (2 (1)	0 0 2 1	
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Find f(0) and f(1). Find a recurrence relation for f(n). Express f(n) using a matrix power. Find f(8).

