



Test 1

Name _____ Uni _____

[1] Find the intersection of the following two affine subspaces of \mathbb{R}^3 .

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} + \begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix} s$$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 2 \\ 1 \\ 0 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \\ -1 \end{bmatrix} t$$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} =$$



Test 1

[2] Find the inverse to the matrix

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

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



Test 1

[3] Find A^n where A is the matrix

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

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



Test 1

[4] Find A^n where A is the matrix

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

$$A^n = \frac{\begin{array}{|c|} \hline \square \\ \hline \square \end{array}}{\begin{array}{|c|} \hline \square \\ \hline \square \end{array}} \begin{bmatrix} \square & \square \\ \square & \square \end{bmatrix} + \frac{\begin{array}{|c|} \hline \square \\ \hline \square \end{array}}{\begin{array}{|c|} \hline \square \\ \hline \square \end{array}} \begin{bmatrix} \square & \square \\ \square & \square \end{bmatrix}$$



Test 1

[5] Find A^n where A is the matrix

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

$$A^n = \frac{\begin{array}{|c|} \hline \square \\ \hline \square \\ \hline \end{array}}{\begin{array}{|c|} \hline \square \\ \hline \end{array}} \begin{bmatrix} \square & \square & \square \\ \square & \square & \square \\ \square & \square & \square \end{bmatrix} + \frac{\begin{array}{|c|} \hline \square \\ \hline \square \\ \hline \end{array}}{\begin{array}{|c|} \hline \square \\ \hline \end{array}} \begin{bmatrix} \square & \square & \square \\ \square & \square & \square \\ \square & \square & \square \end{bmatrix} + \frac{\begin{array}{|c|} \hline \square \\ \hline \square \\ \hline \end{array}}{\begin{array}{|c|} \hline \square \\ \hline \end{array}} \begin{bmatrix} \square & \square & \square \\ \square & \square & \square \\ \square & \square & \square \end{bmatrix}$$



Test 1

[6] Find e^{At} where A is the matrix

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

$$e^{At} = \frac{\begin{bmatrix} \square & \square \\ \square & \square \end{bmatrix}}{\begin{bmatrix} \square \\ \square \end{bmatrix}} \begin{bmatrix} \square & \square & \square \\ \square & \square & \square \\ \square & \square & \square \end{bmatrix} + \frac{\begin{bmatrix} \square & \square \\ \square & \square \end{bmatrix}}{\begin{bmatrix} \square \\ \square \end{bmatrix}} \begin{bmatrix} \square & \square & \square \\ \square & \square & \square \\ \square & \square & \square \end{bmatrix} + \frac{\begin{bmatrix} \square & \square \\ \square & \square \end{bmatrix}}{\begin{bmatrix} \square \\ \square \end{bmatrix}} \begin{bmatrix} \square & \square & \square \\ \square & \square & \square \\ \square & \square & \square \end{bmatrix}$$

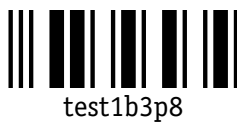


Test 1

[7] Solve the differential equation $y' = Ay$ where

$$A = \begin{bmatrix} 1 & -2 & -2 \\ -1 & 3 & 2 \\ 1 & -2 & -1 \end{bmatrix}, \quad y(0) = \begin{bmatrix} 0 \\ 1 \\ 2 \end{bmatrix}$$

$$y = \frac{\begin{bmatrix} \\ \end{bmatrix}}{\begin{bmatrix} \end{bmatrix}} \begin{bmatrix} \\ \\ \end{bmatrix} + \frac{\begin{bmatrix} \\ \end{bmatrix}}{\begin{bmatrix} \end{bmatrix}} \begin{bmatrix} \\ \\ \end{bmatrix} + \frac{\begin{bmatrix} \\ \end{bmatrix}}{\begin{bmatrix} \end{bmatrix}} \begin{bmatrix} \\ \\ \end{bmatrix}$$



Test 1

[8] Express the quadratic form

$$x^2 - 2xy + 2y^2 + 2xz + 2z^2$$

as a sum of squares of orthogonal linear forms.

$\boxed{} \left(\boxed{} \right)^2 + \boxed{} \left(\boxed{} \right)^2 + \boxed{} \left(\boxed{} \right)^2$
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