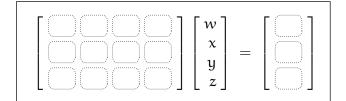
Final Exam Linear Algebra, Dave Bayer, December 16, 2022

Name:							Uni:			
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	Total	

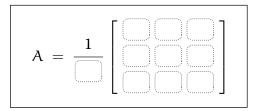
If you need more that one page for a problem, clearly indicate on each page where to look next for your work.

[1] Find a system of equations having as solution set the following affine subspace of \mathbb{R}^4 .

$$\begin{bmatrix} w \\ x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 0 \\ 1 \\ 2 \\ 3 \end{bmatrix} + \begin{bmatrix} 3 \\ 2 \\ 1 \\ 0 \end{bmatrix} t$$



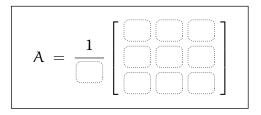
[2] Find the 3 × 3 matrix A that projects \mathbb{R}^3 orthogonally onto the plane x + y + 2z = 0.





[3] Find the 3 × 3 matrix A that projects \mathbb{R}^3 orthogonally onto the plane x + y + z = 0, with respect to the inner product

$$<(a,b,c), (r,s,t)> = [a b c] \begin{bmatrix} 1 & 1 & 0 \\ 1 & 2 & 1 \\ 0 & 1 & 2 \end{bmatrix} \begin{bmatrix} r \\ s \\ t \end{bmatrix}$$





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

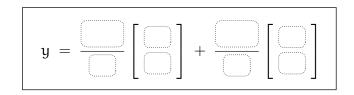
$$A = \begin{bmatrix} 2 & -2 \\ -1 & 1 \end{bmatrix}$$

$$\mathbf{A}^{\mathbf{n}} = \frac{\bigcirc}{\bigcirc} \left[\bigcirc \bigcirc \\ \bigcirc \bigcirc \right] + \frac{\bigcirc}{\bigcirc} \left[\bigcirc \bigcirc \\ \bigcirc \bigcirc \right]$$



[5] Solve the differential equation y' = Ay where

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

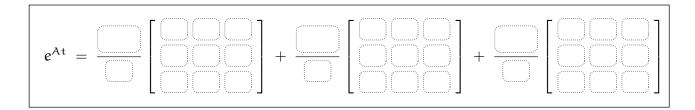


Final Exam, December 16, 2022



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

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

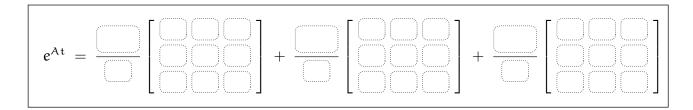


Final Exam, December 16, 2022



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

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



[8] Express the quadratic form

$$3x^2 - 2xy + 2y^2 - 2xz + 2z^2$$

as a linear combination of squares of orthogonal linear forms.

