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Final Exam

Linear Algebra, Dave Bayer, May 10, 2005

Name: _____

[1] (5 pts)	[2] (5 pts)	[3] (6 pts)	[4] (6 pts)	[5] (6 pts)	[6] (6 pts)	[7] (6 pts)	TOTAL

Please work only one problem per page, starting with the pages provided, and identify all continuations clearly.

[1] Find an orthogonal basis for the subspace V of \mathbb{R}^5 spanned by the vectors

$$(1, 0, -1, 0, 1), \quad (1, 0, 0, -1, 1), \quad (0, 1, -1, 0, 1), \quad (0, 1, 0, -1, 1).$$

answer:

work:

[2] By least squares, find the equation of the form $y = ax + b$ which best fits the data

$$(x_1, y_1) = (-1, 0), \quad (x_2, y_2) = (0, 0), \quad (x_3, y_3) = (0, 2), \quad (x_4, y_4) = (1, 1).$$

answer:

work:

[3] Find (s, t) so $\begin{bmatrix} 1 & 1 \\ 1 & 1 \\ 1 & 0 \\ 1 & 0 \\ 0 & -1 \end{bmatrix} \begin{bmatrix} s \\ t \end{bmatrix}$ is as close as possible to $\begin{bmatrix} 1 \\ 0 \\ -1 \\ 0 \\ 1 \end{bmatrix}$.

answer:

work:

[4] Let $A = \begin{bmatrix} 5 & 2 \\ 3 & 4 \end{bmatrix}$. Write A as CDC^{-1} for a diagonal matrix D .

answer:

work:

[5] Let $A = \begin{bmatrix} -1 & 2 & -2 \\ -1 & 2 & 0 \\ 0 & 0 & 2 \end{bmatrix}$. Write A as CDC^{-1} for a diagonal matrix D .

answer:

work:

[6] Let $A = \begin{bmatrix} 3 & 4 \\ 1 & 3 \end{bmatrix}$. Find the matrix exponential e^{At} .

answer:

work:

[7] Let $A = \begin{bmatrix} -1 & 1 & 0 \\ -4 & 3 & 0 \\ 6 & -3 & 2 \end{bmatrix}$. Find the matrix exponential e^{At} .

answer:

work:

Problem: _____

Problem: _____

Problem: _____