[1] (5 pts) Find an orthogonal basis for the subspace \( V \) of \( \mathbb{R}^6 \) consisting of all vectors \((a, b, c, d, e, f)\) such that \( a = b \), \( c = d \), and \( e = f \).

\textit{answer:} 

\textit{work:}
[2] Find an orthogonal basis for the subspace $V$ of $\mathbb{R}^4$ spanned by the vectors $(2, 1, 0, 0), (0, 1, 1, 0), (0, 0, 1, 2)$.

$\text{answer:}$

$\text{work:}$
By least squares, find the equation of the form $y = ax + b$ which best fits the data $(x_1, y_1) = (0, 0), (x_2, y_2) = (1, 2), (x_3, y_3) = (2, 1), (x_4, y_4) = (3, 0)$.

answer:

work:
[4] Find \((s, t)\) so
\[
\begin{bmatrix}
1 & 0 \\
0 & 1 \\
2 & 0 \\
0 & 2
\end{bmatrix}
\begin{bmatrix}
s \\
t
\end{bmatrix}
\]
is as close as possible to
\[
\begin{bmatrix}
1 \\
1 \\
3 \\
3
\end{bmatrix}
\]

\textit{answer:}

\textit{work:}
Let $A = \begin{bmatrix} 0 & 1 & -1 \\ 0 & -1 & 0 \\ 1 & 1 & -2 \end{bmatrix}$. Find the eigenvalues and eigenvectors of $A$.

Answer:

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

answer:

work:
Let $A = \begin{bmatrix} 0 & 1 & -1 \\ -2 & 3 & -1 \\ -2 & 2 & 0 \end{bmatrix}$. Find the matrix exponential $e^{At}$.

**Answer:**

**Work:**

---

Page 7

Continued on back of page _____