This print-out should have 6 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

001 10.0 points

Given that $\{\mathbf{x}_1, \mathbf{x}_2\}$ is a basis for W, find an orthogonal basis $\{\mathbf{v}_1, \mathbf{v}_2\}$ for W when

$$\mathbf{x}_1 = \begin{bmatrix} -2\\2\\2 \end{bmatrix}, \quad \mathbf{x}_2 = \begin{bmatrix} 5\\-3\\-4 \end{bmatrix}.$$

$$\mathbf{v}_1 = \begin{bmatrix} -1\\1\\1 \end{bmatrix}, \quad \mathbf{v}_2 = \begin{bmatrix} 9\\-7\\-8 \end{bmatrix}$$

$$\mathbf{v}_1 = \begin{bmatrix} -1 \\ 1 \\ -2 \end{bmatrix}, \quad \mathbf{v}_2 = \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}$$

$$\mathbf{v}_1 = \begin{bmatrix} -1 \\ 1 \\ -2 \end{bmatrix}, \quad \mathbf{v}_2 = \begin{bmatrix} -1 \\ 1 \\ 1 \end{bmatrix}$$

$$\mathbf{\widehat{4}} \cdot \mathbf{v}_1 = \begin{bmatrix} -1 \\ 1 \\ 1 \end{bmatrix}, \quad \mathbf{v}_2 = \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}$$

$$\mathbf{v}_1 = \begin{bmatrix} -1 \\ 1 \\ -2 \end{bmatrix}, \quad \mathbf{v}_2 = \begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}.$$

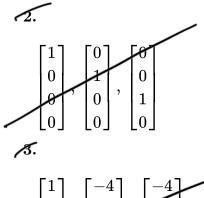
002 10.0 points

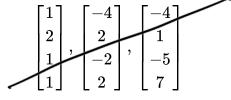
Find a set of orthogonal vectors which spans the same space as the following vectors:

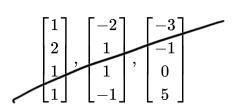
$$\begin{bmatrix} 1\\2\\1\\1 \end{bmatrix}, \begin{bmatrix} -1\\8\\1\\5 \end{bmatrix}, \begin{bmatrix} -6\\-3\\-7\\5 \end{bmatrix}$$

$$1.$$

$$\begin{bmatrix} 1\\2\\1\\1 \end{bmatrix}, \begin{bmatrix} -4\\2\\-2\\2 \end{bmatrix}, \begin{bmatrix} 2\\-2\\-2\\4 \end{bmatrix}$$







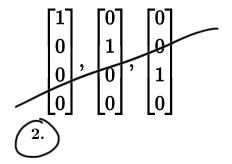
003 10.0 points

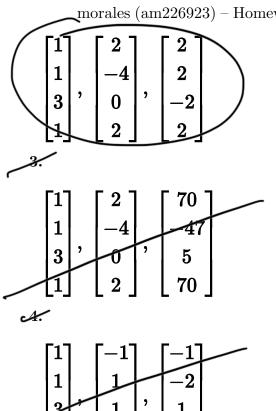
Find a set of orthogonal vectors which spans the same space as the following vectors:

$$\begin{bmatrix} 1 \\ 1 \\ 3 \\ 1 \end{bmatrix}, \begin{bmatrix} 5 \\ -1 \\ 9 \\ 5 \end{bmatrix}, \begin{bmatrix} 3 \\ -6 \\ -8 \\ 3 \end{bmatrix}$$

/

A.



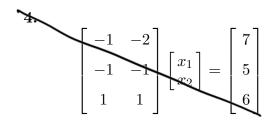


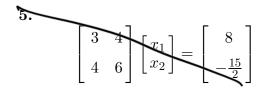
004 10.0 points

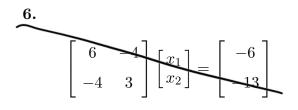
Construct the normal equations for the least-squares solution of $A\mathbf{x} = \mathbf{b}$ when

least-squares solution of
$$A\mathbf{x} = \mathbf{b}$$
 when
$$A = \begin{bmatrix} -1 & -2 \\ -1 & -1 \\ 1 & 1 \end{bmatrix}, \quad \mathbf{b} = \begin{bmatrix} 7 \\ 5 \\ 6 \end{bmatrix}.$$

$$\begin{bmatrix} 3 & 4 \\ 4 & 6 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} -6 \\ -13 \end{bmatrix}$$
2.
$$\begin{bmatrix} 6 & 4 \\ -4 & 3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 8 \\ -\frac{15}{2} \end{bmatrix}$$







005 10.0 points

Find the least-squares solution of $A\mathbf{x} = \mathbf{b}$ when

$$A = \begin{bmatrix} 2 & -2 \\ -1 & 1 \\ -1 & 2 \end{bmatrix}, \quad \mathbf{b} = \begin{bmatrix} 1 \\ 4 \\ 4 \end{bmatrix}.$$

$$\overbrace{1.\frac{1}{5}\begin{bmatrix}16\\18\end{bmatrix}}$$

$$2. \frac{1}{5} \begin{bmatrix} 19\\20 \end{bmatrix}$$

$$\begin{array}{c|c}
3. \frac{1}{5} \begin{bmatrix} 1 \\ -3 \end{bmatrix} \\
4. \begin{bmatrix} 1 \\ 4 \end{bmatrix}
\end{array}$$

5.
$$\begin{bmatrix} -6 \\ 10 \end{bmatrix}$$

Find the least-squares solution of $A\mathbf{x} = \mathbf{b}$ when

$$A = \begin{bmatrix} -1 & -2 \\ 0 & 0 \\ 2 & 3 \\ 1 & 1 \end{bmatrix}, \quad \mathbf{b} = \begin{bmatrix} 1 \\ -7 \\ 4 \\ 3 \end{bmatrix}.$$

$$\begin{array}{c|c}
1. & 1 & 18 \\
\hline
2. & 16 & 16
\end{array}$$

$$3. & \begin{bmatrix} 23 \\ -12 & \end{bmatrix}$$

$$4. & \begin{bmatrix} 19 \\ 13 \end{bmatrix}$$

$$5. & 1 & \begin{bmatrix} 19 \\ 13 \end{bmatrix}$$