

LINEAR MODELS AND DECISIONS MID-TERM

$$S = \{1, 2, 3\} \quad T = \{2, 3\}$$

- 5 1) FIND $S \cap T$
 5 2) FIND $S \times T$
 5 3) CAN A 1-TO-1 CORRESPONDENCE BE CONSTRUCTED FROM S TO T ? EXPLAIN.

$$H = \langle S, + \rangle \quad S = \{A, B, C, D\} \quad +: S \times S \rightarrow S \text{ AS IN THE TABLE}$$

+	A	B	C	D
A	A	B	C	D
B	B	C	D	A
C	C	D	A	B
D	D	A	B	C

- 10 4) IS H ASSOCIATIVE? EXPLAIN.
 5 5) DOES H HAVE AN IDENTITY? EXPLAIN.
 10 6) DOES H HAVE INVERSES? EXPLAIN.
 5 7) IS H COMMUTATIVE? EXPLAIN.

10 8) DEFINE A VECTOR SPACE.

10 9) DEFINE A LINEAR COMBINATION.

10 10) ARE THE VECTORS $\left\{ \begin{pmatrix} 2 \\ 0 \\ 2 \end{pmatrix}, \begin{pmatrix} 5 \\ 5 \\ 0 \end{pmatrix}, \begin{pmatrix} 10 \\ 0 \\ -9 \end{pmatrix} \right\}$ LINEARLY INDEPENDENT?

10 11) DEFINE A BASIS.

5 12) $\begin{pmatrix} 3 \\ -2 \\ 5 \end{pmatrix} + \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix} = ?$

5 13) $7 \begin{pmatrix} 3 \\ 4 \\ 3 \end{pmatrix} = ?$

10 14) ARE $\left\{ \begin{pmatrix} 1 \\ 2 \\ 7 \end{pmatrix}, \begin{pmatrix} 3 \\ 2 \\ -1 \end{pmatrix} \right\}$ ORTHOGONAL?

5 15) ORTHONORMAL?

10 16) WHAT IS THE LENGTH OF $\begin{pmatrix} 1 \\ 3 \\ 2 \\ 1 \\ 4 \\ 1 \\ 2 \end{pmatrix}$?

10 17) WHAT IS THE DISTANCE BETWEEN $\begin{pmatrix} -3 \\ 0 \\ 5 \\ 2 \end{pmatrix}$ AND $\begin{pmatrix} 1 \\ -2 \\ 4 \\ 4 \end{pmatrix}$?

5 18) $-2 \begin{pmatrix} 0 & 2 & 1 \\ 3 & 5 & 4 \end{pmatrix} = ?$

5 19) $\begin{pmatrix} -1 & 2 \\ 3 & 0 \\ -2 & 5 \end{pmatrix} + \begin{pmatrix} 2 & 1 \\ -5 & 3 \\ 0 & -7 \end{pmatrix} = ?$

5 20) $\begin{pmatrix} 2 & 0 & -1 \\ 3 & -2 & 5 \end{pmatrix} \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix} = ?$