Graphics 2

Matrix and vector operations Non-assessed exercise

SOLUTIONS

Matrix operations

$$A = \begin{bmatrix} 3 & 2 \\ 4 & 1 \end{bmatrix} \qquad B = \begin{bmatrix} 0 & -2 \\ 4 & 5 \end{bmatrix} \qquad C = \begin{bmatrix} 4 & 1 & 0 \\ 1 & 3 & 2 \\ 0 & 2 & 5 \end{bmatrix} \qquad D = \begin{bmatrix} 2 \\ 1 \\ 4 \end{bmatrix} \qquad E = \begin{bmatrix} 9 & 0 & 5 \end{bmatrix}$$

1.
$$A + B = \begin{bmatrix} 3 & 0 \\ 8 & 6 \end{bmatrix}$$

$$2. \qquad B + A = \begin{bmatrix} 3 & 0 \\ 8 & 6 \end{bmatrix}$$

- 3. C + D Undefined, matrices have to be of the same size
- 4. C + E Undefined, matrices have to be of the same size

5.
$$3E = [27 \ 0 \ 15]$$

$$6. \qquad 2A + B = \begin{bmatrix} 6 & 2 \\ 12 & 7 \end{bmatrix}$$

7.
$$A * B = \begin{bmatrix} 8 & 4 \\ 4 & -3 \end{bmatrix}$$

8.
$$B * A = \begin{bmatrix} -8 & -2 \\ 32 & 13 \end{bmatrix}$$

10.
$$C*D = \begin{bmatrix} 9\\13\\22 \end{bmatrix}$$

11. D * C Undefined. The number of columns in the first matrix must be equal to the number of rows in the second matrix

13.
$$D * E = \begin{bmatrix} 18 & 0 & 10 \\ 9 & 0 & 5 \\ 36 & 0 & 20 \end{bmatrix}$$

14.
$$E * D = [38]$$

Vector operations

15.
$$3\overline{a} = [3 \ 3 \ 0]$$

16.
$$-2\bar{c} = [-4 -6 -2]$$

17.
$$\overline{a} + \overline{b} = [0 \quad 3 \quad 0]$$

18.
$$\overline{c} - \overline{d} = [-3 \quad 10 \quad -1]$$

19.
$$\overline{a} \cdot \overline{b} = 1$$

20.
$$\overline{b} \cdot \overline{a} = 1$$

21.
$$\overline{c} \cdot \overline{d} = -9$$

22.
$$\overline{a} \times \overline{b} = [0 \ 0 \ 3]$$

23.
$$\overline{b} \times \overline{a} = [0 \quad 0 \quad -3]$$

24.
$$\overline{a} \times \overline{c} + \overline{c} \times \overline{a} = [0 \ 0 \ 0]$$

25.
$$\overline{a} \times \overline{e} = [1 -1 -14]$$