Graphics 2
Matrix and vector operations
Non-assessed exercise

SOLUTIONS

Matrix operations

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

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

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

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. $3E = \begin{bmatrix} 27 & 0 & 15 \end{bmatrix}$

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

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

12. $E * C = \begin{bmatrix} 36 & 19 & 25 \end{bmatrix}$

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

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

Vector operations

$\bar{a} = [\ 1 \quad 1 \quad 0\ ]$ $\bar{b} = [\ -1 \quad 2 \quad 0\ ]$ $\bar{c} = [\ 2 \quad 3 \quad 1\ ]$ $\bar{d} = [\ 5 \quad -7 \quad 2\ ]$

15. $3\bar{a} = [\ 3 \quad 3 \quad 0\ ]$
16. $-2\bar{c} = [\ -4 \quad -6 \quad -2\ ]$
17. $\bar{a} + \bar{b} = [\ 0 \quad 3 \quad 0\ ]$
18. $\bar{c} - \bar{d} = [\ -3 \quad 10 \quad -1\ ]$
19. $\bar{a} \cdot \bar{b} = 1$
20. $\bar{b} \cdot \bar{a} = 1$
21. $\bar{c} \cdot \bar{d} = -9$
22. $\bar{a} \times \bar{b} = [\ 0 \quad 0 \quad 3\ ]$
23. $\bar{b} \times \bar{a} = [\ 0 \quad 0 \quad -3\ ]$
24. $\bar{a} \times \bar{c} + \bar{c} \times \bar{a} = [\ 0 \quad 0 \quad 0\ ]$
25. $\bar{a} \times \bar{e} = [\ 1 \quad -1 \quad -14\ ]$