

MATH1130: Calculus II

SELF-ASSESSMENT SHEET 4: MATRICES

- 1.) For each of the following linear functions \mathbf{T} , find a matrix B such that $\mathbf{T}(\mathbf{x}) = B\mathbf{x}$.
Click on "Evaluate" after you have filled in the appropriate numbers.

(i) $\mathbf{T}(x, y) = (x + y, 2x - 3y)$

$$B = \begin{pmatrix} \underline{\hspace{2cm}} & \underline{\hspace{2cm}} \\ \underline{\hspace{2cm}} & \underline{\hspace{2cm}} \end{pmatrix}$$

(ii) $\mathbf{T}(x, y) = (2x, 3y, x + y, x - y, 2x - 3y)$

$$B = \begin{pmatrix} \underline{\hspace{2cm}} & \underline{\hspace{2cm}} \\ \underline{\hspace{2cm}} & \underline{\hspace{2cm}} \\ \underline{\hspace{2cm}} & \underline{\hspace{2cm}} \\ \underline{\hspace{2cm}} & \underline{\hspace{2cm}} \\ \underline{\hspace{2cm}} & \underline{\hspace{2cm}} \end{pmatrix}$$

(iii) $\mathbf{T}(w, x, y, z) = (2w + x - y + 3z, w + 2x - 3z)$

$$B = \begin{pmatrix} \underline{\hspace{2cm}} & \underline{\hspace{2cm}} & \underline{\hspace{2cm}} & \underline{\hspace{2cm}} \\ \underline{\hspace{2cm}} & \underline{\hspace{2cm}} & \underline{\hspace{2cm}} & \underline{\hspace{2cm}} \end{pmatrix}$$

Evaluate

- 2.) Multiply the following matrices.

Click on "Evaluate" after you have filled in the appropriate numbers.

(i)

$$\begin{pmatrix} 1 & 2 & 3 \\ -3 & 2 & 1 \end{pmatrix} \begin{pmatrix} 3 & 4 & -1 \\ 0 & 2 & 4 \\ 2 & 1 & -2 \end{pmatrix} = \begin{pmatrix} \underline{\hspace{2cm}} & \underline{\hspace{2cm}} & \underline{\hspace{2cm}} \\ \underline{\hspace{2cm}} & \underline{\hspace{2cm}} & \underline{\hspace{2cm}} \end{pmatrix}$$

Evaluate

Please turn over!

(ii)

$$(1 \ 2 \ 3 \ -1) \begin{pmatrix} 2 & 1 \\ 3 & 1 \\ -2 & 4 \\ 0 & -4 \end{pmatrix} = \left(\underline{\hspace{2cm}} \ \underline{\hspace{2cm}} \right)$$

(iii)

$$\begin{pmatrix} 2 & -3 \\ 1 & 4 \end{pmatrix} \begin{pmatrix} 1 & 4 \\ 2 & -2 \end{pmatrix} = \left(\begin{array}{cc} \underline{\hspace{2cm}} & \underline{\hspace{2cm}} \\ \underline{\hspace{2cm}} & \underline{\hspace{2cm}} \end{array} \right)$$

Evaluate

3.) Let $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$, $B = \begin{pmatrix} 2 & 1 \\ 4 & 3 \end{pmatrix}$, $C = \begin{pmatrix} 1 & 2 & 1 \\ 0 & 1 & 2 \end{pmatrix}$ and $D = \begin{pmatrix} 0 & 1 \\ 1 & 0 \\ 2 & 3 \end{pmatrix}$. Which of the

following expressions are defined?

Click on "Evaluate" after you have ticked those which are defined.

$A + B$

$2A - B$

$A - C$

$C + D$

AB

BA

AC

CA

BD

DB

CD

DC

Evaluate