

All of the calculations and operations in this section, below, agree with the answers in the text.

8 - 16 Addition and scalar multiplication of matrices and vectors. Let the 5 matrices and 3 vectors for this section be defined below:

$$\mathbf{A} = \begin{pmatrix} 0 & 2 & 4 \\ 6 & 5 & 5 \\ 1 & 0 & -3 \end{pmatrix}$$

$$\mathbf{B} = \begin{pmatrix} 0 & 5 & 2 \\ 5 & 3 & 4 \\ -2 & 4 & -2 \end{pmatrix}$$

$$\mathbf{C} = \begin{pmatrix} 5 & 2 \\ -2 & 4 \\ 1 & 0 \end{pmatrix}$$

$$\mathbf{D} = \begin{pmatrix} -4 & 1 \\ 5 & 0 \\ 2 & -1 \end{pmatrix}$$

$$\mathbf{E} = \begin{pmatrix} 0 & 2 \\ 3 & 4 \\ 3 & -1 \end{pmatrix}$$

$\{\{0, 2, 4\}, \{6, 5, 5\}, \{1, 0, -3\}\}$

$\{\{0, 5, 2\}, \{5, 3, 4\}, \{-2, 4, -2\}\}$

$\{\{5, 2\}, \{-2, 4\}, \{1, 0\}\}$

$\{\{-4, 1\}, \{5, 0\}, \{2, -1\}\}$

$\{\{0, 2\}, \{3, 4\}, \{3, -1\}\}$

$\mathbf{bu} = \{\{1.5\}, \{0\}, \{-3\}\}$

$\mathbf{bv} = \{\{-1\}, \{3\}, \{2\}\}$

$\mathbf{bw} = \{\{-5\}, \{-30\}, \{10\}\}$

$\{\{1.5\}, \{0\}, \{-3\}\}$

$\{\{-1\}, \{3\}, \{2\}\}$

$\{\{-5\}, \{-30\}, \{10\}\}$

Find the following expressions, indicating which of the rules in (3) or (4) they illustrate, or give reasons why they are not defined.

9. $3\mathbf{A}$, $0.5\mathbf{B}$, $3\mathbf{A} + 0.5\mathbf{B}$, $3\mathbf{A} + 0.5\mathbf{B} + \mathbf{C}$

3 A // MatrixForm

$$\begin{pmatrix} 0 & 6 & 12 \\ 18 & 15 & 15 \\ 3 & 0 & -9 \end{pmatrix}$$

0.5 B // MatrixForm

$$\begin{pmatrix} 0. & 2.5 & 1. \\ 2.5 & 1.5 & 2. \\ -1. & 2. & -1. \end{pmatrix}$$

(3 A + 0.5 B) // MatrixForm

$$\begin{pmatrix} 0. & 8.5 & 13. \\ 20.5 & 16.5 & 17. \\ 2. & 2. & -10. \end{pmatrix}$$

3 A + .5 B + C

**{ {0. + C, 8.5 + C, 13. + C},
 {20.5 + C, 16.5 + C, 17. + C}, {2. + C, 2. + C, -10. + C} }**

Above: Some interpretation needed. In the 4th problem part, since the operation with C is not defined, Mathematica leaves the addend in symbolical form.

11. $8C + 10D$, $2(5D + 4C)$, $0.6C - 0.6D$, $0.6(C - D)$

(8 CC + 10 DD) // MatrixForm

$$\begin{pmatrix} 0 & 26 \\ 34 & 32 \\ 28 & -10 \end{pmatrix}$$

2 (5 DD + 4 CC) // MatrixForm

$$\begin{pmatrix} 0 & 26 \\ 34 & 32 \\ 28 & -10 \end{pmatrix}$$

0.6 CC - 0.6 DD // MatrixForm

$$\begin{pmatrix} 5.4 & 0.6 \\ -4.2 & 2.4 \\ -0.6 & 0.6 \end{pmatrix}$$

0.6 (CC - DD) // MatrixForm

$$\begin{pmatrix} 5.4 & 0.6 \\ -4.2 & 2.4 \\ -0.6 & 0.6 \end{pmatrix}$$

13. $(2 \cdot 7)C$, $2(7C)$, $-D + 0E$, $E - D + C + u$

2 × 7 CC // MatrixForm

$$\begin{pmatrix} 70 & 28 \\ -28 & 56 \\ 14 & 0 \end{pmatrix}$$

2 (7 CC) // MatrixForm

$$\begin{pmatrix} 70 & 28 \\ -28 & 56 \\ 14 & 0 \end{pmatrix}$$

-DD + 0 E // MatrixForm

$$\begin{pmatrix} 4 & -1 \\ -5 & 0 \\ -2 & 1 \end{pmatrix}$$

EE - DD + CC + bu

Thread::tdlerr: Objectsofunequallengthin {0, 2} + {4, -1} + {5, 2} + {1.5} cannotbe combined>>

Thread::tdlerr: Objectsofunequallengthin {3, 4} + {-5, 0} + {-2, 4} + {0} cannotbe combined>>

Thread::tdlerr: Objectsofunequallengthin {3, -1} + {-2, 1} + {1, 0} + {-3} cannotbe combined>>

General::stop: Furtheroutputof Thread::tdlenwillbe suppressedduringthiscalculation>>

**{{1.5} + {0, 2} + {4, -1} + {5, 2},
{0} + {-5, 0} + {-2, 4} + {3, 4}, {-3} + {-2, 1} + {1, 0} + {3, -1}}**

15. (u + v) - w, u + (v - w), C + 0 w, 0 E + u - v

(bu + bv) - bw

{{5.5}, {33}, {-11}}

bu + (bv - bw)

{{5.5}, {33}, {-11}}

CC + 0 bw

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Thread::tdlerr: Objectsofunequallengthin {-2, 4} + {0} cannotbe combined>>

Thread::tdlerr: Objectsofunequallengthin {1, 0} + {0} cannotbe combined>>

General::stop: Furtheroutputof Thread::tdlenwillbe suppressedduringthiscalculation>>

{{0} + {5, 2}, {0} + {-2, 4}, {0} + {1, 0}}

0 EE + bu - bv

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Thread::tclert: Objectsofunequallengthin {0, 0} + {0} + {-3} cannotbe combined>>

Thread::tclert: Objectsofunequallengthin {0, 0} + {-3} + {-2} cannotbe combined>>

General::stop: Furtheroutputof Thread::tclenwillbe suppressedduringthiscalculation>>

{{1} + {1.5} + {0, 0}, {-3} + {0} + {0, 0}, {-3} + {-2} + {0, 0}}

17. **u + v + w**

bu + bv + bw

{{-4.5}, {-27}, {9}}