

Show your work. Answers with no work receive no credit.

1. Use the matrices given to answer the following arithmetic problems. If a problem cannot be solved, explain why it cannot be solved.

$$A = \begin{bmatrix} 1 & 2 & 3 \end{bmatrix} \quad B = \begin{bmatrix} 4 & 5 & 6 \end{bmatrix}$$

$$C = \begin{bmatrix} 7 \\ 8 \\ 9 \end{bmatrix} \quad D = \begin{bmatrix} 10 & 11 \\ 12 & 13 \\ 14 & 15 \end{bmatrix}$$

(a)  $A + B$

$$\begin{bmatrix} 1+4 & 2+5 & 3+6 \end{bmatrix} = \begin{bmatrix} 5 & 7 & 9 \end{bmatrix}$$

$A, B, A+B$  all same size

(b)  $B + C$

$$\begin{matrix} B \\ 1 \times 3 \end{matrix} \quad \begin{matrix} C \\ 3 \times 1 \end{matrix} \quad \text{sizes don't match, so cannot add}$$

(c)  $C + D$

$$\begin{matrix} C \\ 3 \times 1 \end{matrix} \quad \begin{matrix} D \\ 3 \times 2 \end{matrix} \quad \text{sizes don't match, so cannot add}$$

(d)  $7A + 2B$

$$\begin{bmatrix} 7(1) & 7(2) & 7(3) \end{bmatrix} + \begin{bmatrix} 2(4) & 2(5) & 2(6) \end{bmatrix}$$

$$= \begin{bmatrix} 7 & 14 & 21 \end{bmatrix} + \begin{bmatrix} 8 & 10 & 12 \end{bmatrix} = \begin{bmatrix} 15 & 24 & 33 \end{bmatrix}$$

All same size  
so can add.  
Can Always multiply by 7

(e)  $AB$

$$\begin{matrix} A & B \\ 1 \times 3 & 1 \times 3 \end{matrix}$$

middle sizes don't match, so cannot multiply

(f)  $BC$

$$\begin{matrix} B & C \\ 1 \times 3 & 3 \times 1 \end{matrix}$$

so answer is  $1 \times 1$

$$\begin{bmatrix} 4(7) + 5(8) + 6(9) \end{bmatrix} = \begin{bmatrix} 28 + 40 + 54 \end{bmatrix} = \begin{bmatrix} 122 \end{bmatrix}$$

(g)  $AD$

$$\begin{matrix} A & D \\ 1 \times 3 & 3 \times 2 \end{matrix}$$

so answer is  $1 \times 2$

$$\begin{bmatrix} 1(10) + 2(12) + 3(14), & 1(11) + 2(13) + 3(15) \end{bmatrix}$$

$$= \begin{bmatrix} 10 + 24 + 42 & 11 + 26 + 45 \end{bmatrix}$$

$$= \begin{bmatrix} 76 & 82 \end{bmatrix}$$