

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.

$$A = [1 \ 2 \ 3] \quad B = [4 \ 5 \ 6]$$
$$C = \begin{bmatrix} 7 \\ 8 \\ 9 \end{bmatrix} \quad D = \begin{bmatrix} 10 & 11 \\ 12 & 13 \\ 14 & 15 \end{bmatrix}$$

(a)  $A + B$

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

(b)  $B + C$

Cannot be solved. Dimensions don't match exactly.  
 $B$  is  $1 \times 3$ ,  $C$  is  $3 \times 1$ .

(c)  $C + D$

Cannot be solved. Dimensions don't match exactly.  
 $C$  is  $3 \times 1$ ,  $D$  is  $3 \times 2$

(d)  $7A + 2B$

$$\begin{aligned} &= 7[1 \ 2 \ 3] + 2[4 \ 5 \ 6] = [7(1) \ 7(2) \ 7(3)] + [2(4) \ 2(5) \ 2(6)] \\ &= [7 \ 14 \ 21] + [8 \ 10 \ 12] = [7+8 \ 14+10 \ 21+12] \\ &= [15 \ 24 \ 33] \end{aligned}$$

(e)  $AB$

Cannot be solved. Dimensions are not compatible.

$A$  is  $1 \times 3$ ,  $B$  is  $1 \times 3$

↑     ↓  
these must match.

(f)  $BC$

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

(g)  $AD$

$$\begin{aligned} [1 \ 2 \ 3] \begin{bmatrix} 10 & 11 \\ 12 & 13 \\ 14 & 15 \end{bmatrix} &= [1(10) + 2(12) + 3(14) \quad 1(11) + 2(13) + 3(15)] \\ &= [10 + 24 + 42 \quad 11 + 26 + 45] \\ &= [76 \ 82] \end{aligned}$$