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) $A + B$

$[1+4 \quad 2+5 \quad 3+6] = [5 \quad 7 \quad 9]$

A, B, A+B all same size

(b) $B + C$

B: 1×3 C: 3×1 sizes don't match, so cannot add

(c) $C + D$

C: 3×1 D: 3×2 sizes don't match, so cannot add

(d) $7A + 2B$

$[7(1) \quad 7(2) \quad 7(3)] + [2(4) \quad 2(5) \quad 2(6)]$

$= [7 \quad 14 \quad 21] + [8 \quad 10 \quad 12] = [15 \quad 24 \quad 33]$

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

(e) AB

A: 1×3 B: 3×1 middle sizes don't match, so cannot multiply

(f) BC

B: 1×3 C: 3×1 so answer is 1×1

$[4(7) + 5(8) + 6(9)] = [28 + 40 + 54] = [122]$

(g) AD

A: 1×3 D: 3×2 so answer is 1×2

$[1(10) + 2(12) + 3(14), \quad 1(11) + 2(13) + 3(15)]$

$= [10 + 24 + 42 \quad 11 + 26 + 45]$

$= [76 \quad 82]$