10.1.1 $x = (4, 3)$

a) 1×2 dimensions

b) $5x = 5 \cdot 4 = 20, \quad 5 \cdot 3 = 15$ $\quad 5x = (20, 15)$

c) $3x = 3 \cdot 4 = 12, \quad 3 \cdot 3 = 9$ $\quad 3x = (12, 9)$

d) $5x + 3x = (20, 15) + (12, 9) = (32, 24)$

e) $8x = 5x + 3x = (32, 24)$

f) $4x - x = 3x = (12, 9)$

g) $x^T \quad x = (4, 3) \quad x^T = \begin{pmatrix} 4 \\ 3 \end{pmatrix}$ new dimension 2×1.

h) $x + x^T$ are not defineable, because they have different dimensions $(1 \times 2, 2 \times 1)$.

i) $\|x\| = \sqrt{x_1^2 + x_2^2} = \sqrt{4^2 + 3^2} = \sqrt{16 + 9} = \sqrt{25} = 5$

10.1.2

a) 4×1 dimensions $\qquad v = \begin{pmatrix} 3 \\ 7 \\ 0 \\ 11 \end{pmatrix}$

b) $2v = 2 \cdot \begin{pmatrix} 3 \\ 7 \\ 0 \\ 11 \end{pmatrix} = \begin{pmatrix} 6 \\ 14 \\ 0 \\ 22 \end{pmatrix}$

c) $5v + 2v = 5 \cdot \begin{pmatrix} 3 \\ 7 \\ 0 \\ 11 \end{pmatrix} = \begin{pmatrix} 15 \\ 35 \\ 0 \\ 55 \end{pmatrix} + \begin{pmatrix} 6 \\ 14 \\ 0 \\ 22 \end{pmatrix} = \begin{pmatrix} 21 \\ 49 \\ 0 \\ 77 \end{pmatrix}$