2.4.1 a. $\begin{pmatrix} 3 & 5 \\ 1 & 2 \end{pmatrix}\begin{pmatrix} 2 & -5 \\ -1 & 3 \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ ✓

b. $6\begin{pmatrix} 3 & 0 \\ 1 & -4 \end{pmatrix}\frac{1}{2}\begin{pmatrix} 4 & 0 \\ 1 & -3 \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ ✓

2.4.2 a. $\left(\begin{array}{cc|cc} 1 & -1 & 1 & 0 \\ -1 & 3 & 0 & 1 \end{array}\right) \xrightarrow{R_2+R_1} \left(\begin{array}{cc|cc} 1 & -1 & 1 & 0 \\ 0 & 2 & 1 & 1 \end{array}\right) \xrightarrow{\frac{1}{2}R_2} \left(\begin{array}{cc|cc} 1 & -1 & 1 & 0 \\ 0 & 1 & \frac{1}{2} & \frac{1}{2} \end{array}\right) \xrightarrow{R_1+R_2} \left(\begin{array}{cc|cc} 1 & 0 & \frac{3}{2} & \frac{1}{2} \\ 0 & 1 & \frac{1}{2} & \frac{1}{2} \end{array}\right)$

b. $\left(\begin{array}{cc|cc} 4 & 1 & 1 & 0 \\ 3 & 2 & 0 & 1 \end{array}\right) \xrightarrow{\frac{1}{4}R_1} \left(\begin{array}{cc|cc} 1 & \frac{1}{4} & \frac{1}{4} & 0 \\ 3 & 2 & 0 & 1 \end{array}\right) \xrightarrow{R_2-3R_1} \left(\begin{array}{cc|cc} 1 & \frac{1}{4} & \frac{1}{4} & 0 \\ 0 & \frac{5}{4} & -\frac{3}{4} & 1 \end{array}\right) \xrightarrow{\frac{4}{5}R_2} \left(\begin{array}{cc|cc} 1 & 1/4 & 1/4 & 0 \\ 0 & 1 & -3/5 & 4/5 \end{array}\right)$

$\xrightarrow{R_1-\frac{1}{4}R_2} \left(\begin{array}{cc|cc} 1 & 0 & 2/5 & -1/5 \\ 0 & 1 & -3/5 & 4/5 \end{array}\right)$ ✓

c. $\begin{pmatrix} 0 & 1 & 2 \\ 0 & -1 & -3 \\ -1 & 1 & 2 \end{pmatrix}$ d. $\begin{pmatrix} 2 & -1 & 3 \\ 3 & 1 & -1 \\ 1 & 1 & -2 \end{pmatrix}$ $0-\frac{1}{4}\times\frac{4}{5}$

2.4.4 a. $\vec{x} = A^{-1}b = \begin{pmatrix} 1 & -1 & 3 \\ 2 & 0 & 5 \\ -1 & 1 & 0 \end{pmatrix}\begin{pmatrix} 1 \\ -1 \\ 3 \end{pmatrix} = \begin{pmatrix} 11 \\ 17 \\ -2 \end{pmatrix}$ ✓

b. $B = A^{-1}AB = A^{-1}\begin{pmatrix} 1 & -1 & 2 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \end{pmatrix} = \begin{pmatrix} 1 & -1 & 3 \\ 2 & 0 & 5 \\ -1 & 1 & 0 \end{pmatrix}\begin{pmatrix} 1 & -1 & 2 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \end{pmatrix} = \begin{pmatrix} 4 & -2 & 1 \\ 7 & -2 & 4 \\ -1 & 2 & -1 \end{pmatrix}$ ✓

c. $C = CAA^{-1} = \begin{pmatrix} 1 & 2 & -1 \\ 3 & 1 & 1 \end{pmatrix}^{2\times3}\begin{pmatrix} 1 & -1 & 3 \\ 2 & 0 & 5 \\ -1 & 1 & 0 \end{pmatrix}^{3\times3} = \begin{pmatrix} 6 & -2 & 13 \\ 4 & -2 & 14 \end{pmatrix}$ ✓

2.4.9 a. False, $A = \begin{pmatrix} 1 & 0 \\ 0 & 0 \end{pmatrix}$ ✓ $1+4+1$ $-1 -1 \quad 3 \neq 0$

b. False, $A = \begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix}$, $B = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ ✓

c. $(A^{-1}B)^T = B^T(A^{-1})^T = B^T(A^T)^{-1}$ B^T inv, $(A^T)^{-1}$ inv ✓

d. $A^4 = 3I \Rightarrow |A^4| = 3^3 = 27 \Rightarrow |A| = 27^{\frac{1}{4}} \neq 0 \Rightarrow A$ inv ✓ $A^4 = 3I \Rightarrow A(\frac{1}{3}A^3) = I \Rightarrow A^{-1} = \frac{1}{3}A^3$

3.1.1 a. $\begin{vmatrix} 2 & -1 \\ 3 & 2 \end{vmatrix} = 4--3 = 7$ ✓

b. $\begin{vmatrix} 6 & 9 \\ 8 & 12 \end{vmatrix} = 6\times12 - 9\times8 = 0$ ✓

f. -39 ✓

g. $0, \{x | x\left(\begin{smallmatrix} 5 \\ 3 \\ 5 \end{smallmatrix}\right), s\in R\}$ ✓

k. -33 ✓

L. $0, \{x | x = \left(\begin{smallmatrix} -3s \\ 0 \\ s \\ 0 \end{smallmatrix}\right), s\in R\}$ ✓

3.2.3 a. $\det(A^3BC^TB^{-1}) = |A|^3|B||C|\frac{1}{|B|} = |A|^3|C| = (-1)^3 3 = -3$ ✓

b. $|B^2C^{-1}AB^{-1}C^T| = |B|^2\frac{1}{|C|}|A|\frac{1}{|B|}|C| = |B||A| = 2\cdot(-1) = -2$ ✓

3.2.4 a. $|B^{-1}AB| = \frac{1}{|B|}|A||B| = |A|$ ✓

b. $|A^{-1}B^{-1}AB| = \frac{1}{|A|}\frac{1}{|B|}|A||B| = 1$ ✓