Sect 2.4
Answer key

4. $$\begin{bmatrix} A & B \\ -XA+C & -XB+D \end{bmatrix}$$

5. $Y = B^{-1}$
$X = -B^{-1}A$, $Z = C$

6. Assume $A, X, C,$ & Z square
then $X = A^{-1}$ & $Z = C^{-1}$
$\Rightarrow$ $Y = -C^{-1}BA^{-1}$

10. $X = -A + BC$
$Y = -B$
$Z = -C$

13. (a) Suppose A^{-1} exists
let $A^{-1} = \begin{bmatrix} D & E \\ F & G \end{bmatrix}$

~~Suppose +~~
then $AA^{-1} = \begin{bmatrix} B & 0 \\ 0 & C \end{bmatrix}\begin{bmatrix} D & E \\ F & G \end{bmatrix} = \begin{bmatrix} BD & BE \\ CF & CG \end{bmatrix} = \begin{bmatrix} I & 0 \\ 0 & I \end{bmatrix}$

So $BD = I$ & $CG = I$
means B & C are invertible

(b) Suppose B^{-1} & C^{-1} exist

$$\begin{bmatrix} B & 0 \\ 0 & C \end{bmatrix}\begin{bmatrix} B^{-1} & 0 \\ 0 & C^{-1} \end{bmatrix} = \begin{bmatrix} BB^{-1} & 0 \\ 0 & CC^{-1} \end{bmatrix} = \begin{bmatrix} I & 0 \\ 0 & I \end{bmatrix} = I$$

So A^{-1} exists

15 $$\begin{bmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \end{bmatrix} = \begin{bmatrix} I & 0 \\ A_{21}A_{11}^{-1} & I \end{bmatrix}\begin{bmatrix} A_{11} & 0 \\ 0 & S \end{bmatrix}\begin{bmatrix} I & A_{11}^{-1}A_{12} \\ 0 & I \end{bmatrix}$$