

3.67(c)

1 3.67(c), §1 Asked

Asked: Find the inverse of

$$\begin{pmatrix} 1 & 3 & -2 \\ 2 & 8 & -3 \\ 1 & 7 & 1 \end{pmatrix}$$

2 3.67(c), §2 Solution

Augment with the unit matrix:

$$\begin{pmatrix} 1 & 3 & -2 & | & 1 & 0 & 0 \\ 2 & 8 & -3 & | & 0 & 1 & 0 \\ 1 & 7 & 1 & | & 0 & 0 & 1 \end{pmatrix} \begin{array}{l} (1) \\ (2) \\ (3) \end{array}$$

Reduce to row canonical:

$$\begin{pmatrix} 1 & 3 & -2 & | & 1 & 0 & 0 \\ 0 & 2 & 1 & | & -2 & 1 & 0 \\ 0 & 4 & 3 & | & -1 & 0 & 1 \end{pmatrix} \begin{array}{l} (1) \\ (2') = (2) - 2(1) \\ (3') = (3) - (1) \end{array}$$

$$\begin{pmatrix} 2 & 0 & -7 & | & 8 & -3 & 0 \\ 0 & 2 & 1 & | & -2 & 1 & 0 \\ 0 & 0 & 1 & | & 3 & -2 & 1 \end{pmatrix} \begin{array}{l} (1') = 2(1) - 3(2') \\ (2') \\ (3'') = (3') - 2(2') \end{array}$$

$$\begin{pmatrix} 2 & 0 & 0 & | & 29 & -17 & 7 \\ 0 & 2 & 0 & | & -5 & 3 & -1 \\ 0 & 0 & 1 & | & 3 & -2 & 1 \end{pmatrix} \begin{array}{l} (1'') = (1') + 7(3'') \\ (2'') = (2') - (3'') \\ (3'') \end{array}$$

$$\begin{pmatrix} 1 & 0 & 0 & | & 14.5 & -8.5 & 3.5 \\ 0 & 1 & 0 & | & -2.5 & 1.5 & -0.5 \\ 0 & 0 & 1 & | & 3 & -2 & 1 \end{pmatrix} \begin{array}{l} (1''') = (1'')/2 \\ (2''') = (2'')/2 \\ (3''') \end{array}$$

The inverse matrix is at the right. Verify that $AA^{-1} = I$.