M,

HW5 soln

Sec. 2.3

34.

(a)

det $A = abc$, hence A is invertible

$\Leftrightarrow \det A \neq 0$

$\Leftrightarrow a, b, c \neq 0$

the inverse is

$$A^{-1} = \left[\operatorname{diag}(1/a, 1/b, 1/c) \right]$$

(b) the same argument as above.

for $A = \operatorname{diag}(a_{11}, \cdots, a_{nn})$ invertibe

iff $a_{ii} \neq 0$ for $\forall i$.

Sec. 2.4

Sec. 2.4

5. $\begin{bmatrix} 1 & 0 \\ 0 & 1 \\ 0 & 0 \end{bmatrix} \begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{bmatrix} a & b \\ c & d \\ 0 & 0 \end{bmatrix}$

8. $\begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix} \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

40. $A = AB \cdot B^{-1}$ $\quad AB = \begin{bmatrix} 1 & 3 \\ 2 & 5 \end{bmatrix}^{-1} = \begin{bmatrix} -5 & 3 \\ 2 & -1 \end{bmatrix}$

$= \begin{bmatrix} -5 & 3 \\ 2 & -1 \end{bmatrix} \begin{bmatrix} 1 & 2 \\ 3 & 5 \end{bmatrix} = \begin{bmatrix} 4 & 5 \\ -1 & -1 \end{bmatrix}$

see back

Sec. 3.1

14. $\begin{bmatrix} 1 & 1 \\ 1 & 2 \\ 1 & 3 \\ 1 & 4 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix} x_1 + \begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \end{bmatrix} x_2.$

hence, $\operatorname{span} A = \{ (1\ 1\ 1\ 1)^T, (1\ 2\ 3\ 4)^T \}.$