4.3-5.2 Homework Solution

- 4.3-30
  (a)
  $C_1 = 0$, $C_2 = -1$, $C_3 = 0$, $C_4 = 1$
  (b)
  $$C_5 = \begin{vmatrix} 0 & 1 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 \end{vmatrix} = (-1) * \begin{vmatrix} 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{vmatrix} = (-1) * 1 * C_3 = 0$$
  $C_n = -C_{n-2}$
  $C_{10} = -C_8 = C_6 = -C_4 = -1$

- 4.4-17
  (a)
  $$y = \frac{\begin{vmatrix} a & 1 \\ c & 0 \end{vmatrix}}{\begin{vmatrix} a & b \\ c & d \end{vmatrix}} = \frac{-c}{ad-bc}$$
  (b)
  $$y = \frac{\begin{vmatrix} a & 1 & c \\ d & 0 & f \\ g & 0 & i \end{vmatrix}}{\begin{vmatrix} a & b & c \\ d & e & f \\ g & h & i \end{vmatrix}} = \frac{fg-di}{a(ej-fh)-b(di-fg)+c(dh-ge)}$$

- 5.1-32
  $$\begin{vmatrix} -\lambda & 1 & 0 \\ 0 & -\lambda & 1 \\ a & b & c-\lambda \end{vmatrix} = \lambda^2(c-\lambda) + a + \lambda b = -\lambda^3 + c\lambda^2 + b\lambda + a$$
  $a = 0$, $b = 9$, $c = 0$

- 5.2-12
  (a)True
  $detA = 1 * 1 * 2 = 2 \neq 0$, so it is invertible.

  (b)False

$A = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 1 & 0 & 2 \end{bmatrix}$
$S = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$
S^{-1} does not exist. A is not diagonalizable.

(c)False
$A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 2 \end{bmatrix}$
$S = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$
A is diagonalizable.

- 5.2-28

(1)
$A = \begin{bmatrix} 8 & a \\ b & 2 \end{bmatrix}$
$\det A = 25 = 16 - ab$
$ab = -9$
(2) $A = \begin{bmatrix} 9 & 4 \\ -4 & 1 \end{bmatrix}$
(3) $A = \begin{bmatrix} 10 & 5 \\ -5 & 0 \end{bmatrix}$

eiganvector of (1)(2)(3) is $\begin{bmatrix} t \\ -t \end{bmatrix}$.