

Några svar till svarslösa uppgifter i läroboken.

7.1

- 2a) $\lambda = 3, \lambda = -1,$
b) $\lambda = 4$
c) $\lambda = \sqrt{12}, \lambda = -\sqrt{12}$
d) Inga reella egenvärden.
- 3a) $\lambda = 3$ ger egenvektorn $(1/2, 1)$, $\lambda = -1$ ger egenvektorn $(0, 1)$.
b) $\lambda = 4$ ger egenvektorn $(3/2, 1)$.
c) $\lambda = \sqrt{12}$ ger egenvektorn $(3/\sqrt{12}, 1)$, $\lambda = -\sqrt{12}$ ger egenvektorn $(-3/\sqrt{12}, 1)$.
d) Inget.
- 5a) $\lambda = 1, \lambda = 2, \lambda = 3.$
c) $\lambda = -8.$
f) $\lambda = -4, \lambda = 3.$
- 6a) $\lambda = 1$ ger egenvektorn $(0, 1, 0)$ $(-1/2, 1, 1)$, $\lambda = 2$ ger egenvektorn $(-1/2, 1, 1)$, $\lambda = 3$ ger egenvektorn $(-1, 1, 1)$.
c) $\lambda = -8$ ger egenvektorn $(-1 - 1, 6)$.
f) $\lambda = -4$ ger egenvektorn $(-6, 8, 3)$, ger egenvektorn $\lambda = 3$ ger egenvektorn $(5, -2, 1)$.
- 8a) $\lambda = 1, \lambda = -2, \lambda = -1.$
- 9a) $\lambda = 1$ ger egenvektorn $(0, 0, 0, 1)$ och $(2, 3, 1, 0)$, $\lambda = -2$ ger egenvektorn $(-1, 0, 1, 0)$, $\lambda = -1$ ger egenvektorn $(-2, 1, 1, 0)$.
- 10a) $\lambda = -1, \lambda = 5.$
b) $\lambda = 1, \lambda = 7, \lambda = 3.$
c) $\lambda = -1/3, \lambda = 1, \lambda = 1/2.$
- 11) $\lambda = 1, \lambda = 1/512, \lambda = 512.$

7.2

8)

$$P = \begin{pmatrix} 4/5 & 3/4 \\ 1 & 1 \end{pmatrix}.$$

10)

$$P = \begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 1 \\ -1 & 0 & 1 \end{pmatrix}.$$

12) Ej diagonaliserbar.

13)

$$P = \begin{pmatrix} 1 & 2 & 1 \\ 1 & 3 & 3 \\ 1 & 3 & 4 \end{pmatrix}.$$

14) Ej diagonaliserbar.

15)

$$P = \begin{pmatrix} -1/3 & 0 & 0 \\ 0 & 1 & 0 \\ 1 & 0 & 1 \end{pmatrix}.$$

19)

$$P = \begin{pmatrix} -1 & 10237 & -2047 \\ 0 & 1 & 0 \\ 0 & 10245 & -2048 \end{pmatrix}.$$

7.3

2)

$$P = \begin{pmatrix} 1/\sqrt{2} & -1/\sqrt{2} \\ 1/\sqrt{2} & 1/\sqrt{2} \end{pmatrix}.$$

3

$$P = \begin{pmatrix} -2/\sqrt{7} & \sqrt{3}/\sqrt{7} \\ \sqrt{3}/\sqrt{7} & 2/\sqrt{7} \end{pmatrix}.$$

4)

$$P = \begin{pmatrix} -2/\sqrt{5} & 1/\sqrt{5} \\ 1/\sqrt{5} & 2/\sqrt{5} \end{pmatrix}.$$

5)

$$P = \begin{pmatrix} -4/5 & 0 & 3/5 \\ 0 & 1 & 0 \\ 3/5 & 0 & 4/5 \end{pmatrix}.$$

6)

$$P = \begin{pmatrix} 1/\sqrt{2} & 1/\sqrt{2} & 0 \\ 1/\sqrt{2} & -1/\sqrt{2} & 0 \\ 0 & 0 & 1 \end{pmatrix}.$$

7)

$$P = \begin{pmatrix} 1/\sqrt{3} & 1/\sqrt{6} & 1/\sqrt{2} \\ 1/\sqrt{3} & -2/\sqrt{6} & 0 \\ 1/\sqrt{3} & 1/\sqrt{6} & -1/\sqrt{2} \end{pmatrix}.$$

9.5

4a) $2x^2 + 5y^2 - 6xy$.

c) $x^2 - 3y^2 + 5z^2$.

d) $-2x_1^2 + 3x_3^2 + 7x_1x_2 + x_1x_3 + 12x_2x_3$.

6a) max 4, min -2 i $\pm(1/\sqrt{6}, 1/\sqrt{6}, 2/\sqrt{6})$ resp $\pm(-1/\sqrt{3}, -1/\sqrt{3}, 1/\sqrt{3})$

b) max 3, min 0 i $\pm(2/\sqrt{6}, 1/\sqrt{6}, 1/\sqrt{6})$ resp $\pm(1/\sqrt{3}, -1/\sqrt{3}, -1/\sqrt{3})$

c) max 4, min 2 i $\pm(1/\sqrt{2}, 0, 1/\sqrt{2})$ resp $\pm(-1/\sqrt{2}, 0, 1/\sqrt{2})$ och $\pm(0, 1, 0)$.

9.6

2a)

$$\begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \frac{1}{3} \begin{pmatrix} 2 & 1 & 2 \\ -2 & 2 & 1 \\ -1 & -2 & 2 \end{pmatrix} \begin{pmatrix} y_1 \\ y_2 \\ y_3 \end{pmatrix}$$

$y_1^2 + 7y_2^2 + 4y_3^2$.

10) $13y''^2 - 4x''^2 = 8$, hyperbel.

9.7

7a) $9x'^2 + 36y'^2 + 4z'^2 = 36$, ellipsoid.

b) $6x'^2 + 3y'^2 - 2z'^2 = 18$, enmantlad hyperboloid.

c) $3x'^2 - 3y'^2 - z'^2 = 3$, tvåmantlad hyperboloid.

f) $7x'^2 - 3y'^2 + z' = 0$, hyperbolisk paraboloid.

8) a) $25x'^2 - 3y'^2 - 50z'^2 = 150$ tvåmantlad hyperboloid.

b) $2x'^2 + 2y'^2 + 8z'^2 = 5$, ellipsoid.

c) $9x'^2 + 4y'^2 - 36z' = 0$, elliptisk paraboloid.

d) $x'^2 - y'^2 + z' = 0$, hyperbolisk paraboloid.