# Fasit

## Fasit til oppgaver, kapittel 1

**Oppgave 1.** -
**Oppgave 2.** a) 3 b) $-1$ c) 25 d) $\frac{3}{2}$
**Oppgave 3.**

4 : $2\times 2, 2\times 1, 2\times 1$

17 : $2\times 2, 2\times 2, 2\times 2$

20 : $3\times 4, 4\times 3, 3\times 3$

21 : $3\times 3, 3\times 4, 3\times 4$

**Oppgave 4.**

$$\begin{pmatrix} 2 \\ -3 \end{pmatrix}$$

**Oppgave 5.**

$$\begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$$

**Oppgave 6.**

$$\begin{pmatrix} -2 \\ -1 \\ 4 \end{pmatrix}$$

**Oppgave 7.**

$$\begin{pmatrix} 1 \\ -3 \end{pmatrix}$$

**Oppgave 8.**

$$\begin{pmatrix} -2 \\ 1 \\ 2 \end{pmatrix}$$

**Oppgave 9.**

$$(1,2)$$

**Oppgave 10.**

$$(1,3)$$

**Oppgave 11.**

$$(10,9,16)$$

**Oppgave 12.**

a)

$$AB = \begin{pmatrix} -2 & -1 & -2 & 2 \\ 4 & 0 & 0 & 6 \\ 8 & 2 & 4 & 2 \\ 2 & 0 & 0 & 3 \end{pmatrix}, BA = \begin{pmatrix} 5 & -2 \\ 7 & 0 \end{pmatrix}$$

b)

$$AB = \begin{pmatrix} 1 & 2 \\ 1 & 0 \\ 1 & -2 \end{pmatrix}$$

Produktet $B \cdot A$ har ingen mening.

c)

$$AB = (2),\ BA = \begin{pmatrix} 1 & 2 & 3 \\ -1 & -2 & -3 \\ 1 & 2 & 3 \end{pmatrix}$$

d) $AB = BA = (6)$

**Oppgave 13.**

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

**Oppgave 14.**

$$\begin{pmatrix} 3 & 6 & 3 \\ 3 & 0 & 1 \end{pmatrix}$$

**Oppgave 15.**

$$\begin{pmatrix} 1 & 1 \\ 1 & 2 \end{pmatrix}$$

**Oppgave 16.**

$$\begin{pmatrix} 1 & 1 & 0 \\ -1 & 2 & -3 \\ 0 & 3 & 3 \end{pmatrix}$$

**Oppgave 17.**

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

**Oppgave 18.**

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

**Oppgave 19.**

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

**Oppgave 20.**

$$\begin{pmatrix} 4 & -4 & 6 \\ 6 & -6 & 4 \\ 0 & 0 & -2 \end{pmatrix}$$

**Oppgave 21.**

$$\begin{pmatrix} 1 & 3 & 4 & 1 \\ 3 & 1 & -1 & 2 \\ 2 & 2 & 2 & 3 \end{pmatrix}$$

**Oppgave 22.**

$$\begin{pmatrix} 2 & 4 & 6 \\ 3 & 6 & 5 \\ 1 & 2 & 3 \end{pmatrix}$$

**Oppgave 23.**

$$\begin{pmatrix} \frac{11}{2} & \frac{17}{2} \\ \frac{-4}{5} & 3 \end{pmatrix}$$

**Oppgave 24.**

$$\begin{pmatrix} 1 & 2 \\ -5 & -3 \end{pmatrix}$$

**Oppgave 25.**

$$A^2 = \begin{pmatrix} 1 & 0 \\ 2c & 1 \end{pmatrix}, A^3 = \begin{pmatrix} 1 & 0 \\ 3c & 1 \end{pmatrix}, A^n = \begin{pmatrix} 1 & 0 \\ nc & 1 \end{pmatrix}$$

**Oppgave 26.** A - 1,2,3,4,5 B - 1 C - 2 D - 5

**Oppgave 27.** a) $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$ c) $BA = I$

**Oppgave 28.** a) $A^2 = I$, $AB = \begin{pmatrix} 1 & 4 & -1 \\ 1 & 4 & -2 \\ 1 & 3 & -2 \end{pmatrix}$,

$BA = \begin{pmatrix} 2 & -5 & 4 \\ 0 & 1 & -1 \\ 1 & -1 & 0 \end{pmatrix}$ b) $A^{-1} = A$

**Oppgave 29.**

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

**Oppgave 30.**

$$-\frac{1}{12}\begin{pmatrix} 1 & -8 \\ -2 & 4 \end{pmatrix}$$

**Oppgave 31.**

$$\begin{pmatrix} -1 & 1 \\ 1 & 0 \end{pmatrix}$$

**Oppgave 32.**

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

**Oppgave 33.**

$$\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$$

**Oppgave 34.** Produktet av to ortogonale matriser er en ortogonal matrise fordi

$$(PQ)^{-1} = Q^{-1}P^{-1} = Q^T P^T = (PQ)^T$$

**Oppgave 35.** 22
**Oppgave 36.** 2
**Oppgave 37.** 1
**Oppgave 38.** -1
**Oppgave 39.** 0
**Oppgave 40.** 1
**Oppgave 41.** 44
**Oppgave 42.** 60000
**Oppgave 43.** $\frac{1}{4}$
**Oppgave 44.** Underbestemt
**Oppgave 45.** $x = 1, y = 1$
**Oppgave 46.** $x = -\frac{5}{2}, y = 2$
**Oppgave 47.** $x = 2, y = 1$
**Oppgave 48.** $x = 3, y = 0, z = 1$
**Oppgave 49.** $x = 1, y = 2, z = -1$
**Oppgave 50.** $\lambda^2 + \lambda - 2$, Egenverdier: 1 og -2
**Oppgave 51.** $\lambda^2 - 5\lambda - 12$, Egenverdier: $\frac{5 \pm \sqrt{73}}{2}$
**Oppgave 52.** $\lambda^2 - \lambda - 1$, Egenverdier: $\frac{1 \pm \sqrt{5}}{2}$
**Oppgave 53.** $\lambda^2 - 2\lambda - 8$, Egenverdier: 4 og -2
**Oppgave 54.** $\lambda^2 - 1$, Egenverdier: 1 og -1
**Oppgave 55.**

$$A^{-1} = \frac{1}{6}\begin{pmatrix} 3 & 6 & 0 \\ 0 & 6 & 0 \\ -1 & -2 & 2 \end{pmatrix}$$

**Oppgave 56.** -
**Oppgave 57.**

$$\det(A) = 4 \neq 0 \quad A^{-1} = \frac{1}{4}\begin{pmatrix} 3 & -2 \\ -1 & 2 \end{pmatrix}$$

$$\lambda^2 - 5\lambda + 4$$

Egenverdier: 1 og 4
**Oppgave 58.**

$$\det(A) = 1 \quad A^{-1} = A$$

$$\chi_A(\lambda) = -\lambda^3 - \lambda^2 + \lambda + 1$$

Egenverdier: 1 og -1

**Oppgave 59.** a) $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$ b) -1 c) $\begin{pmatrix} 1 \\ 1 \end{pmatrix}$

**Oppgave 60.** a) 2 b) $\frac{1}{2}\begin{pmatrix} 3 & 1 \\ 1 & 1 \end{pmatrix}$ c) $\begin{pmatrix} 5 \\ 3 \end{pmatrix}$
d) $\begin{pmatrix} 2 & -4 \\ -4 & 10 \end{pmatrix}$ e) $\begin{pmatrix} 5 \\ 3 \end{pmatrix}$

**Oppgave 61.** a) 2 b) $\frac{1}{2}\begin{pmatrix} -1 & 2 \\ -3 & 4 \end{pmatrix}$ c) $\begin{pmatrix} 1 \\ 1 \end{pmatrix}$
d) $\begin{pmatrix} 12 & -6 \\ 9 & -3 \end{pmatrix}$ e) $x = y = 1$

**Oppgave 62.** a) 1 c) -1

**Oppgave 63**

$$\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

**Oppgave 64.** a) -1 c) $-\lambda^3 + \lambda^2 + \lambda - 1$,
$\lambda_1 = 1$ (multiplisitet 2), $\lambda_2 = -1$

**Oppgave 65.** a) $A$ symmetrisk b) -1
d) $-\lambda^3 + \lambda^2 + \lambda - 1$

**Oppgave 66.** a) 0 b) $-\lambda^3 + \frac{3}{2}\lambda^2 - \frac{1}{2}\lambda$

**Oppgave 67.** b) $x = 0$, $y = 4$, $z = 3$