Plenumsregning 6: Lineærtransformasjoner

# Innlevering 2

## Oppgave 4

La

1. Finn ved gausseliminasjon.

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**Oppsummering**

* Bytt om på rader for å tilrettelegge for trappeform
* Gjør komplekse elementer til reelle der vi vil eliminere tall
  + Dette gjør det lettere å se hva vi må gange med når vi skal eliminere.
* Unngå brøker. Gjør heller tall større.
* *Slow is fast*: Mange små steg.

# Ekstraoppgaver

## Oppgave 2

1. Finn ut om funksjonen er en lineærtransformajson mellom reelle vektorrom.

Hvis den er det:

1. Finn standardmatrisen til
2. Regn ut
3. Regn ut
4. Finn ut om er injektiv
5. Finn ut om er surjektiv

Definisjon

vektorrom

er en **lineærtransformasjon** hvis

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Definisjon

**Standardmatrisen** til en lineærtransformasjon er

Definisjon

**Kjernen** til ( er mengden av vektorer som sendes til av :

Definisjon

For en funksjon, har vi at er ***injektiv*** (eller ***en-til-en***) hvis det er maksimalt én s.a. .

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Definisjon

For en funksjon, har vi at er**surjekti***v* (eller **på**) hvis det finnes en s.a. .

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Definisjon

Anta at vi har en funksjon .

***Bildet*** til () er mengden av alle elementer i kodomenet som treffes av funksjonen:

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Så bildet kan treffe deler av eller hele , avhengig av om funksjonen er ***surjektiv*** eller ei.

Definisjon

For en funksjon, har vi at er ***bijektiv*** dersom er både *injektiv* og *surjektiv*.

Oppgave 4  
La

og

være basiser for .

* Finn vektoren uttrykt i -basisen.
* Finn matrisene og slik at og for alle i .

Teorem 8.16

-dimensjonalt vektorrom

Da finnes s.a.

hvor kolonnene i er -koordinatvektorene i :

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# Eksamen kont 2019

## Oppgave 3

En lineærtransformasjon avbilder firkanten med hjørner i

og (1,1)

til parallellogrammet utspent av

og

A graph of a function

Description automatically generated

Finn standardmatrisen til og regn ut . Finn k. Er surjektiv?

**Mål**:

1. Finne matrisen for .
2. Finne
3. Finne
4. surjektiv?

«Yndlingsteorem» (utdrag)

-matrise.

Lineærtransformasjonen gitt ved er ***surjektiv***

.

Se <https://wiki.math.ntnu.no/_media/tma4115/2025v/15-inverterbarhet.pdf> for fullstendig versjon.

## Oppgave 5

1. Finn en basis for slik at

Er koordinatene til et andregradspolynom .

1. La være gitt ved . Finn koordinatene til med hensyn på