(4.3)

$\bar{x}$	2	4

3
4

Q → 1-6 (linear comb)

- ↳ Simultaneous equation
- ↳ Reduced Echelon
- ↳

Q7 → spaning vector
→ determine

det = 0
- ↳ Not span
- ↳ dependent.

det ≠ 0
- ↳ span
- ↳ in Dependent.

Q8-10
- ↳ Simultaneous equations.
- ↳ Reduced Echelon.
- ↳ Determine.

4.2

Two Rules

→ (u+v)

→ (ku)

P_∞ —

16) a) → solve → $f = a_0 + a_1x + a_2x^2 + a_3x^3$.

$g = b_0 + b_1x + b_2x^2$.

b) — Subspace

c) — Not solve.

15) a) Subspace — x^5

b) Not — x^6

c) Not — x^7

— $f = x^3 - x^0$

$g = x^0$

R^4 —

14) a)

b) — Not Subspace.

13) a) — Not subspace. — $f = (1,1,1,1)$

$g = (2,4,8,16) \to (a,a^2,a^3,a^4)$

b) — Subspace.

M_{22}.

12) a) Subspace.

b) Subspace.

c) Not subspace. — $\begin{bmatrix} 1 & 0 \\ 2 & 0 \end{bmatrix}$, $\begin{bmatrix} 0 & 3 \\ 0 & 4 \end{bmatrix}$.

11) a) subspace.

b) Not subspace.

c) Not Subspace.

~~b)~~ a)

b)

R^∞

10) a) Subspace. → $v = (v, 2v, 4v, 8v, \dots)$, $w = (w, 2w, 4w, \dots)$

b) Subspace. → $v \in (v_1, v_2, 0, 0, 0, \dots)$, $w = (w_1, w_2, 0, 0, \dots)$.

9) a) Subspace.

b) Not subspace.

$F(-\infty, \infty)$

8) a) Subspace → $f(-x) = f(x)$, $g(-x) = g(x)$

b) Notsubspace → $f = 1 + 2x + 3x^2$, $g = 1 + 2x - 3x^2$

~~c) Subspace.~~

7) a) Subspace → $f(0) = 0$, $g(0) = 0$

b) Notsubspace → $f(0) = 1$, $g(0) = 1$

P_3.

6) b) Subspace → $f = a_0 + a_1 x$, $g = b_0 + b_1 x$ (Real Numbers)

a) Notsubspace → (Irrational Numbers)

5) a) subspace

b) Subspace

M_{nn}.

Invertible/Trivial → $\det(A) \neq 0$

4) a) Subspace.

b) Notsubspace → $A = \begin{bmatrix} 1 & -3 \\ 2 & -4 \end{bmatrix}, B = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$.

c) Subspace → $(A+B)C = AC + BC$ & $(KA)C = K(AC)$

d) Notsubspace → $A = \begin{bmatrix} 1 & -3 \\ 2 & -4 \end{bmatrix}, B = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$. (Invertible)

Diagonal Matrix.

3) a) Subspace → $\begin{bmatrix} a_{11} & 0 \cdots 0 \\ 0 & a_{22} \cdots 0 \\ \cdots & \cdots a_{nn} \end{bmatrix}$. $(\det(A) = 0)$

~~b) Notsubspace~~ → Since determinant is not distributive.

$tr(A) = a_{11} + a_{22} + \dots a_{nn} = 0$

~~c) Subspace~~ → $tr(B) = b_{11} + b_{22} + \dots b_{nn} = 0 \therefore (tr(A) = 0)$

d) Subspace → $A^T = A$, $B^T = B$

Symmetric → $A^T = A$.

R^3

2) a) Notsubspace.

b) Subspace.

c) Notsubspace → $u = (a_1, b_1, c_1)$, $v = (a_2, b_2, c_2)$, condition: $(a + b = 7)$

Date:

→ Axioms List

i) Closure law / Closed property.

$u + v \in V$

$kv \in V$

ii) Communicatative Property.

$u + v = v + u$.

iii) Associatative Property.

$u + (v + w) = (u + v) + w$

iv) Additive property.

There should exist $v = 0 \in V$

such that $0 + v = v + 0 \doteq v$

v) Additive Inverse

$u + (-u) = -u + u = 0$

vi) Scalar Multiplication.

$ku \in v$

vii) Distributive Property

$k(u + v) = ku + kv$

ix) ~~viii)~~ Distributive property

$k(mu) = (km)u$

viii) ~~ix)~~ Associative Property

$(k + m)u = ku + mu$

x)

$1 \cdot u = u$

Some Extensions ⇒

i) $0u = 0$ ii) $c0 = 0$ iii) $-u = (-1)u$.