1(1) y(x)=0 for all t y(t) = 0 u(t) = a u,(t) + Buz (t) y (t) = 0 ult) = u(t-a) y (x) = 0 time invarient ABHISHEK BAMOTRA ANDREW ID: ABAMOTRA 24-677 HW1

y(t) = U(t-a) = y(t-a) = time invarient

(3) yet) = u(3t) Y,(t) = U,(3t) y (t) 2 U2(3+) ult), & u,(t) +BU2(t) 7(t) = u(sc) = \(u_1(3t) + \(\beta u_2(t) \) \(\beta U) = \(\delta y(4) + \(\beta y(4) \) = \(\left \text{mear} \) y(t) = u(3t) ualt) = u(t-a) y (t) = 4 (3t) - u (3t-a) + y (t-a)

(9) y (4) = e-tu(t-7) y,(t), e u,(t-7) y, (t), e-ty(t-T) Ult) = & u, (t) + Bu, (t) $y(t) = e^{-t}u(t-7)$ = $e^{-t}(\alpha u_{1}(t-7) + \beta u_{2}(t-7))$ = e x u, v. (U) = x y, U) + B y U) lmear = e du, (t-1) + e Buz (t-1) Ualt) · u(t-a) y4) , e-tu(t-7) y(t) = e-tu((t-a)-7) + y (t-a) went

y(t) = u(t-1) y, U), U, (+-1) y, (1) , u, (t-1) Uld, & yill) + Bug(t) y(t), u(t-1) = xu,(t-1)+Bu,(t-1) y(t) = xy,(t) + By,(t) linear uaut) = u(t-a) y (t) = u(t-1) = u ((t-a)-1) y (t) = y (t-a)

6) y(x) = [u(1)d1 $y_{1}(t) = \int_{-\infty}^{t} u_{1}(T) dT = u_{1}(t)$ $y_{2}(t) = \int_{-\infty}^{t} u_{2}(T) dT = u_{2}(t)$ xy(4)+ By(4) , x 4,(4) + Bu2(4) J(t) = K y, (t) + B y, (t) = K (4(t) + B u, (t) so linear Ualt) = Wt-a) Jall = Uall)
= U(t-a) - y (t-a) lo time invariant (2) yll) = [u'(t)dT J, (1) 2 JU, 2 (1) y, (1) = 4/12 (b) uz (4) = (X 44 (4) + Buzler) xy(4)+By(4), x42(4)+Bus(6) Ualt) = U (t-a) Jul = u2(t-a) to time

time variant

a4) 0 + b4) u4)

 au_1 ; $1 t \le 0 buy, fo t \le 0$ 0 t > 0 (1 t > 0)

xally 0 + x bey ult)

Ball 0+ Bbll Well

0 649 mly + B 649 mg

linear

(1) Nota field?

I natural number (1,2,3...)

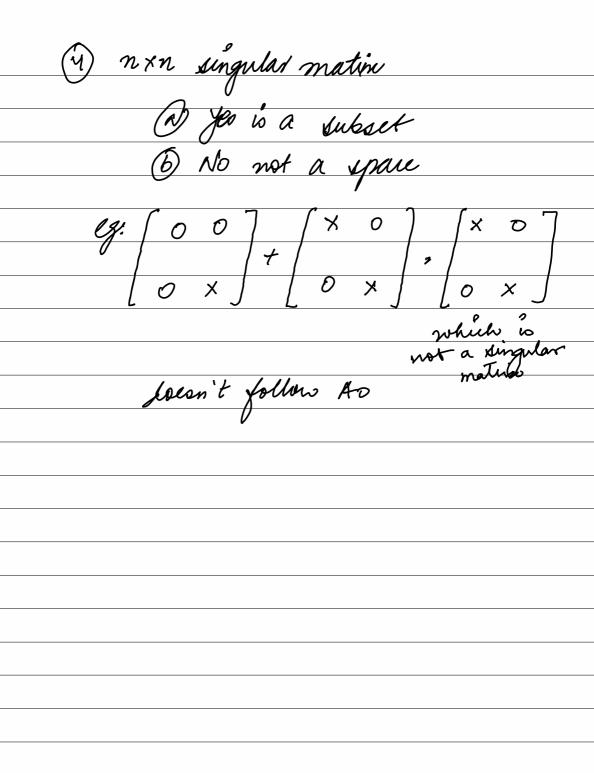
Ages not follow Ay (additine)

inverse De so a field

Rational member

is a field, follows all the conditions. 3 Set of polynomials Does not follows My $\alpha^{-1} \notin F$ $\chi^{2} + \chi + 3$ is not a polynomial. Set of sational functions with real leefficients
is a field, follows all the Londitions

1) n×n skew symmetric matrices @ yes is a sub set 2) To a subspace 2) n x n diagonal matun Byes is a sub set 2) Is a subspace 3) nxn upper diagonal mattin B yes is a space or so a subspace



$$y + (1+y)\dot{y} - y + 0.5y^{3} = 0$$

$$x_{1} = \dot{y} \qquad \therefore \quad \dot{x}_{1} = \dot{y} = x_{2}$$

$$x_{2} = \dot{y} \qquad \dot{x}_{2} = \dot{y}$$

$$x^{2}y$$

$$x^{2}y$$

$$x^{2}x^{2}y$$

$$x^{2}x^{2}$$

$$x^{2}x^{2}$$

$$\frac{\dot{\chi}}{2} = 0 \quad (\equiv m)$$

$$2\chi_{1} - (1+\chi_{1})\chi_{2} - 0.5\chi_{1}^{3}$$

$$2x_{1} - 0.5x_{1} = 0$$

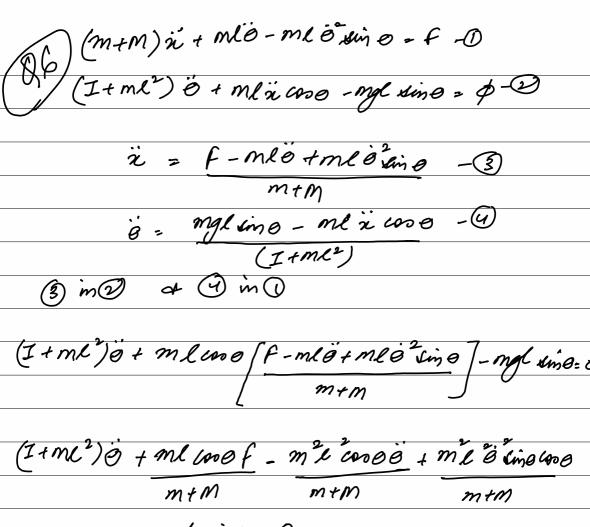
$$2x_{1} - 0.5x_{1}^{2} = 0$$

$$2 - 0.5x_{1}^{2} = 0$$

$$\frac{2-0.5 \times 1^{2} = 0}{2 \times 1 \times 1^{2}}$$

4 × 21 2, = +2 lx it be 2

$$\begin{bmatrix}
2 - x_2 & -(1-x_1) \\
-\frac{3}{2}x_1^2 & -(1-x_1)
\end{bmatrix}$$



_ mgl sine =0 $\frac{\partial}{\partial f}(I+me^2) - \frac{m^2e^2\cos\theta}{m+m} = \frac{mg(\sin\theta - ml\cos\theta)}{m+m}$

- m² l' 0 sin 0 cos 0

(4) in(1) me o sin o 2 f (mtm) x + mlg sine - ml2 x coop $\frac{(I+ml^2)}{-mlo^2 \sin \theta - f}$ $\frac{1}{2}\left(\frac{1}{m+m} - \frac{m^2\ell^2\cos\theta}{(1+m\ell^2)}\right) = \frac{m^2\ell^2g\sin\theta}{(1+m\ell^2)}$ is = f + mlo sino - m²e² g dino (I+me2) (m+m) - m2 2 coso (I+ml2) 0 = mgl sino - ml coso f - m²l²o²sino coso m+M(I+ml2) - m22cmo M +M

4- 4000

$$\frac{df}{d\theta} = \frac{2 \frac{\partial^2 foo(\theta)}{\partial o(\theta)} - 10 loo(\theta)}{4 - loo(\theta)}$$

$$\frac{loo(\theta)}{4 - loo(\theta)}$$

$$\frac{loo(\theta)}{(4 - loo(\theta))^2}$$

$$= -\frac{10 (loo(0))}{4 - loo(0)}$$

$$= -\frac{10}{4 - loo(0)}$$

$$= -\frac{10}{4 - loo(0)}$$

$$\frac{1}{4 - loo(0)}$$

$$\frac{1}{4$$

- we

$$\frac{df_{y} : \dot{\theta}^{2} \sin^{2} \theta + f \sin \theta - \dot{\theta}^{2} \cos^{2} \theta + w \cos \theta - \frac{1}{4} \cos^{2} \theta + \frac{1}{4} \cos^{2} \theta + \frac{1}{4} \cos^{2} \theta - \frac{1}{4} \cos^{2} \theta + \frac{1}{4} \cos^{2} \theta - \frac{1}{4} \cos^{2} \theta + \frac{1}{4} \cos^{2} \theta - \frac{1}{4} \cos^{2} \theta -$$

 $\frac{du}{du} = 0 0 0$ $\frac{2}{4-600} \frac{2}{3}$ $-\frac{2}{3} \frac{2}{3}$ $-\frac{2}{3} \frac{2}{3}$

used derivative-calculator. net for derivative of the terms.

Collabrated / Discussed with (Q3,6)

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