EML 6351 Nonlinear Control -2 - Adaptine Control. Project of million to south Dynamics.  $M(q)\phi + C(\phi,\phi) + G(q) = T$ M(0)= (m, l,2+m2(1,2+21,126+12) m2(1,1262+12) m2(1,12(2+122) m2/2 )= -2m2l, l252\$, \$2 + -m2l, l25/2 000-0 - 000 - 0 m2 l, l2 52 0,2 (r(b) = (m,+m2) gl,c, +m2gl2 42 m2gl2C12 Defening training error. instance CE \$ - d. B(D) E & so por since en of a sold bound ė = \$0 - \$.

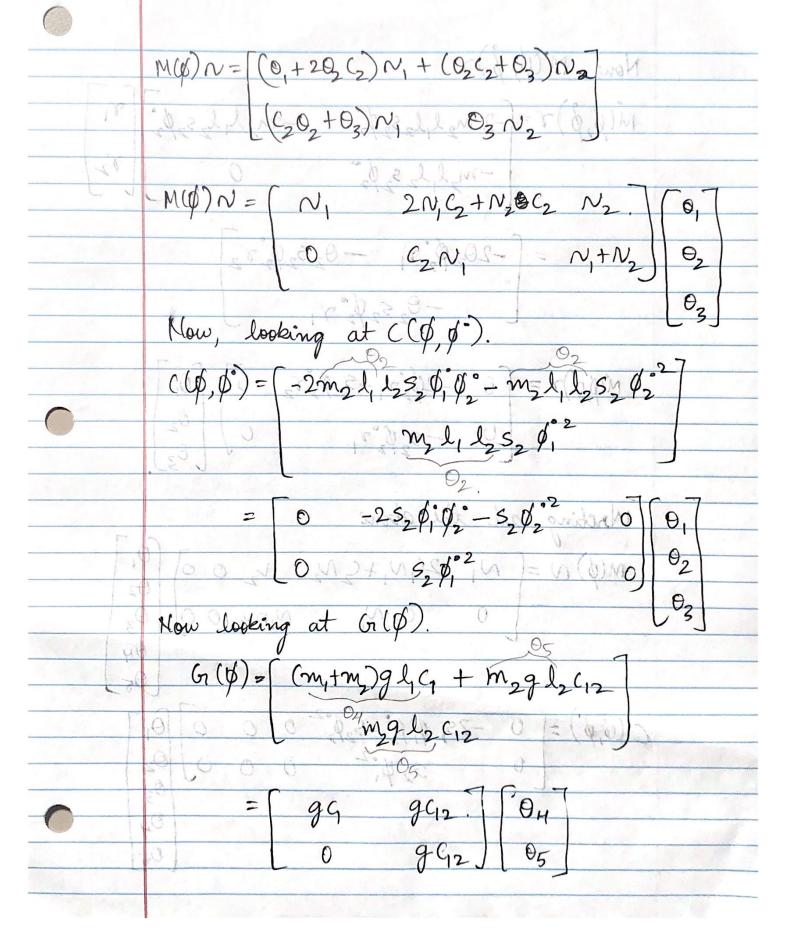
 $M(\phi) \stackrel{\circ}{e} = M(\phi) \stackrel{\circ}{\phi}_{0} - M(\phi) \stackrel{\circ}{\phi}$ feltered training error r= e+de r= e+de. => M(\$) = M(\$) e + M(\$) < e. Sub equ @ me get.  $M(\emptyset) \dot{r} = (M(\emptyset) \dot{\emptyset}_{\partial} - M(\emptyset) \dot{\emptyset}) + M(\emptyset) \lambda e^{-1}$ From dynamics.  $M(\emptyset) \emptyset = \tau - c(\emptyset, \emptyset) - G(\emptyset)$ => M(\$) \$= M(\$)\$ -(T-((\$,\$)-6(\$))+M(\$) xe = M(\$)(\$+ de)+ c(\$,\$)+ G(\$)-T Define  $O \in \mathbb{R}^p$  when p = no of terms en <math>O $2d \quad 0 = 0 - 0$   $= 2 \quad 0 = -0 \quad (: 0 \text{ is a constant}).$ E(t) E R es the parametric update law

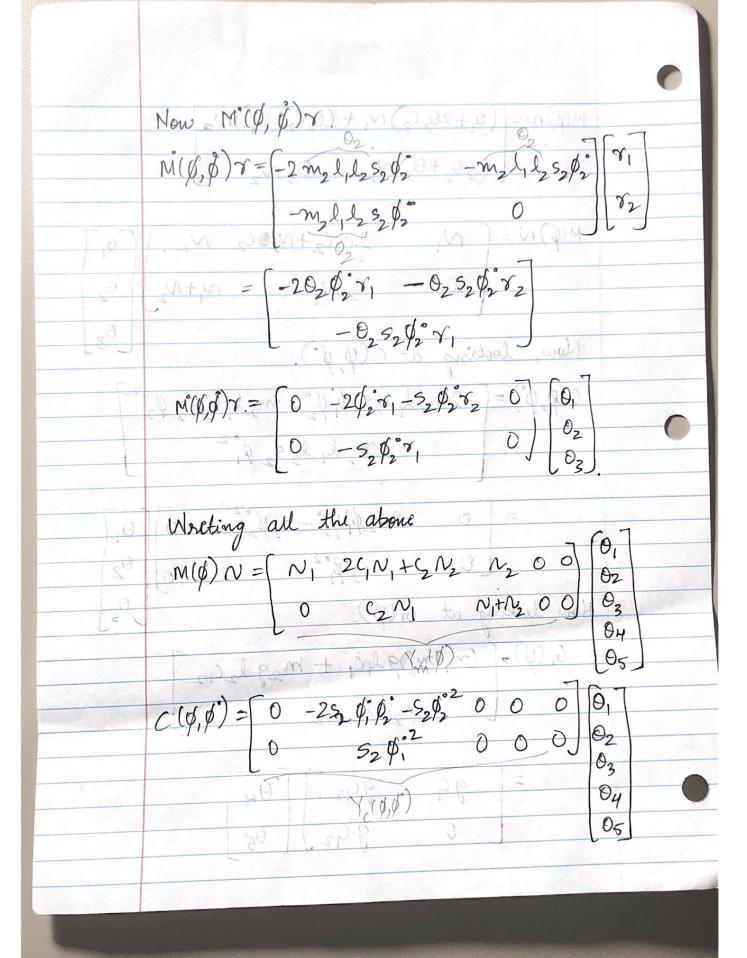
Lyapunov comdidate V(4,+)= /2 ete + /3 TM(0) 8 + /2 0 10. v = e e + 1 x m (g) x + 1/2 x M (g) x + 8 T 6 my know. E= -0° and e= r-xe V= e(x-xe) + / TM(d) x+ / TM(d) 8-0 10 M(Q) = 20 MQD) = 200 0 = M(0M = 2 (m, l,2+m,2(l,2+21, l,2 c, + 1,2) m,2(1, l,2(2+1,2)) m2 (1/2(2+122) m262 -m2(21,1252) 2 -m21,1285 22 -m2/1/252/2 and M(\$) + = M(\$) (\$, +xe) + ((\$, \$) + G(\$) - T v= e(r-ne) + 5 m(0) 8+ 5 m(0) 5-+ 12 T (M(\$) (\$0 the) + ((\$,\$) + G(\$) - T) - 5TT 5

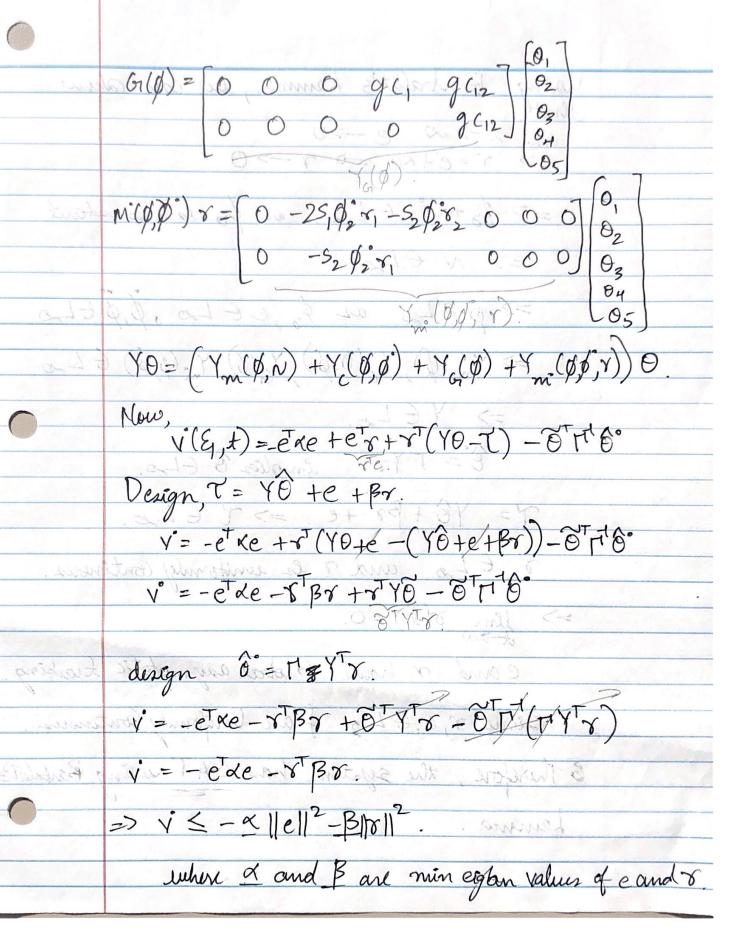
v=-exc+ex-eT6+C(φ,φ)+G(φ)+/2 M(φ) x-T) + x (M(φ) (φ, +xe)+C(φ,φ)+G(φ)+/2 M(φ) x-T) To find the segressor.

we want.

M(β)(β +αė) + ((β,β) + G(β) + /2 M(β) γ = YΘ to get the minimum realization of O  $M(\emptyset)N = [m, l_1^2 + m_2 l_1^2 + m_2 l_2^2 + 2l_1 l_2 c_2 m_2]$ my/2/2+m2/2  $m_2 l_1 l_2 c_2 + m_2 l_2^2$  $C_2O_2+O_3$ (0,+02) N, + (02+03) N2 (02+03) N + 03 N2 5955 JUL 111 + 1 - ( MQ) ( 10 the) + C(0 0) + G(0) - C)







salat's Lemma, me con show => pels or foreELD, p, pELD => Ym(\$), Y(\$,\$), Y(\$), (6,\$ MYV implier & ELD. or ELs and or es emitorney continous could or home Global asymptotic traiting Sime T, C, EL2 & are Uniformly Continous & Therefore, the sepatem has GAT using Barbalat's