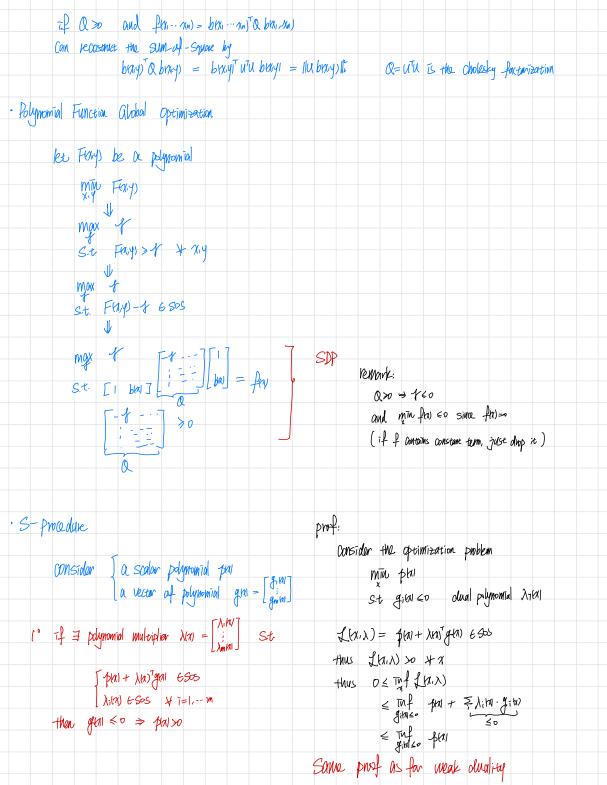


· Pelynomial Abn-ngaetivity	
let fex) be a polynomial function of x.	
problem: 3 x st fay < 0?	
1° ND: f is called PSD. need proof or certificate	
2° Yes: give an x st flarco	
2 RS: YIM W. Y. St. FRIZE	
· Sum-of - Square	
let I be a phynomial,	le annuaciting
f is non-negative = I phynomial g, -g, st. f= g; ++g; Sum-of-square	Metempusivior
In General non-negativity closs not augly Scs	
We can write any polynomial as a quadratic function of monomials	
Eg. f(n,y) = 4x4 + 4xy - 7x3y3 - 2xy3 + 10y4	
$= \begin{bmatrix} \chi^{1} & 4 & 2 & -1 \\ \chi^{2} & 2 & -7 + 3 & 1 \end{bmatrix} \begin{bmatrix} \chi^{2} \\ 1 & 1 \end{bmatrix}$ $= \begin{bmatrix} \chi^{1} & 4 & 2 & -1 \\ \chi^{2} & 2 & -7 + 3 & 1 \end{bmatrix} \begin{bmatrix} \chi^{2} & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$	
(p) -x -1 10 J L y -	
= bray) Tala bray	
TU 2 -67 [0 27 2 1-3]	
$With \lambda = b$ $\begin{bmatrix} 4 & 2 & -b \\ -b & -1 & 10 \end{bmatrix} = \begin{bmatrix} 0 & 2 & 1 \\ 2 & 1 & -3 \end{bmatrix}$ $000 = \begin{bmatrix} 2 & 5 & 4 \\ -b & -1 & 10 \end{bmatrix} = \begin{bmatrix} 0 & 2 & 1 \\ 2 & 1 & -3 \end{bmatrix}$ 15 pSD	
L+b + (0) [1 +3]	
$f(x,y) = \left\ \begin{bmatrix} 0 & 2 & 1 \\ 2 & 1 & 3 \end{bmatrix} \begin{bmatrix} xy \\ y \end{bmatrix} \right\ _{L^{\infty}}$	
T"1	
$= \left(\frac{3344}{4}\right)^2 + \left(\frac{234}{4}\right)^2$	
g, g,	
Suppose $f = pdynomial(N_1,, N_m)$ of olyper 2d let $b(x_1,, N_m)$ be a verter of all monomials with algor $\leq d$	
let bexist (Xn) be a vertar of all monomials with deper < of	
f is sos = I are se fra	
Offine constraint on a by mortding coefs	
VIII CO STANIO ON CO MINUMA (POS	



2°								Σλ _m h	St							
	Haen) ļ	JA1) 4(21) =	+ /\(\) =0	Λ√gγχ ⇒	1) E	; Sos 1) >0									
		(J													