Optimization Review: Linear Programming (LP) Formulations Maximize Minimize: Z= C, x, + C2 x2 + ... + Cnxn Subject to: anx+azxz+...+anxx =b, azix, +azzxz + ... + aznxn = bz X, X2, ... , Xn20 Objective Function: min Z=2x,+3xz Constraints: X1+2x2≥8 2x,+xz 26 *Graph X, , K2 ≥ D Find feasible vertices and plug in Simplex Method. Convert all constraints to equations by introducing stack variables $(\pm,+)(\pm,-)$ 7x1+6x2+05+052 Maximize: TX, + 6x2 Subject to: 2 x1 + 4x2 = 16 2x1 + 4x4 + 5,=16 3x1+2x2+52=12 3 x1+ 2x2 = 12 X1, X2, S1, S220 .X, , X2 3 6 X, X2 X3 X4 X1 X2 X3 X4 Basis 7 6 600 Basis 16 16/2=8 5,0 0 8/3 1 -2/3 24101 12 1213-4 V, 7 1 2/3 0 113 201 7 1413 0 713 28 0 0 0 0 2. R213 0-25 0 413 0 -7/3 600 B,18/3 X, X2 X3 X4 R2-3R, 7600 Basis 0 1 318 - 14 0 -114 1/2 2 X, 7 X1=2 7 6 1/2 2 32 X2=3 16601

6 -6 -0

 $0 \quad 0 \quad -12 \quad -2$

C -1

5

Optimization Review: Sensitivity Analysis Max = 300x, + 200x2 S.t. 2x, + x2 &8 (m1) x, + 2x2 48 (m2) X: = 0 (1=1,2) Slope = - C1 - 2 - C2 - 2 * Suppose unit profit of Prod I and 2 are changed to 350 and 250. Will optimal solution remain the same? 2 6 250 = 7 62 (YES) * Suppose Prod 2 is 200, what is the range of Prod 2 to weep optimal solution unchanged? = = × = 200 100 EX 5400 = Shadow price M, *Shadow price M2 410013-400013 = \$33hr * If we increase capacity of both machines, which should receive priority? (M,) * Should we increase availabity of M, 3 Mz for additional cost of \$50/hr? (m, yes, m2 no)

Optimization Review:	all mark
nadow price hange in optimal objective value per unit mor	ease in RHS constraint
nange in opening i objective value	
Duality:	
nin 54, + 3542+2043	
S.t4, + 4/2 + 43 = 2	
41 + 34z + 043=3	
41,42,4320	
Dual	. 44
max 22,+322	
S.t 2, + 22 = 5	6
₹, +3₹2 ≤35	- Francisco
2,520	
₹, ,₹, ≥0	
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