JUNAID GIRKAR MATHS 60004190057 06/03/21 TUTORIAL- 1 Use dual simplem method to solve the following LPP: Q1 Manimize $Z = -4\eta_1 - 3\eta_2$ n, + n3 62 712 71 -n1 +2n2 41 n1, n2 >0 MAXIMIZE $Z = -4\eta_1 - 3\eta_2$ ANS n1+ n2 <2 $-\mathfrak{N}_2 \leq -1$ -n1 + 2 n2 41 M1, M2 30 Standard form: Maximize $Z = -4m_1 - 3m_2 + 0s_1 + 0s_2 + 0s_3$ $-\eta_1 + \eta_2 + S_1 = 2$ $-912 + S_2 = -1$ - 71, + 2M2 + S3 = 1 Si, S2, S3 >, O 91, 12 > 0(slack variable) (Basis variable) ITERATION 1 0 0 Ci -3 0 -4 53 S, S_2 7/2 Solution 11 $\mathcal{N}_{\mathcal{B}}$ C_{B} 0 1 1 ١ 5, 2 0 $\circ \rightarrow$ 0 0 S_2 0 -1 0 2 S3 4 0 3 0 O Man natio FOR EDUCATIONAL USE **Sundaram**®

	: Y	Zj-Cj	30 k	nut 1	J Ma	*0					
	Fo	r nent	iteration	on .							
		32 is de	ep outing	varial	sle	111		r			
	. 7	Mz is en	texing	variab	1e		-				
		M ₂ is en -1 is K	ey eler	ment		ž.					
			J	1							
	ITERA	710N 2	0			7.					
		Cj									
	CB	NB	Solution	-4	-3	3		0	O	Y	
	0	SI	1		0						
	-3	M2	1	0	1	1 ·	0	-1	0		
		S ₃	-1	(-1)	0	_	0 ,,	2)	\rightarrow	
	Z; -	Cj		4	O	() .	3	0		
	Man 90	atio		-4	_	•-	-	_	-		
								sir	ia .		
	•; V	Z; - C	3 7,0	but	A W.	Bi X	0				
	Fo	ox nent	iteratio	n		-					
	S	3 is dep	auting	variat	ole						
	21	, us ente	ring v	aviab le	2 -						
	-1	ů Ke	y elem	ent							
			J	-	,						
	ITERA	TION 3:	;								
		Cj			- 4	-3	0	0	0		
	\mathcal{C}_{B}	MB	solution	on	71	712	Si	SZ	s ₃		J)
	.Ø	Sı	0		0	O	J	3	1		
,	-3	N ₂	<u> </u>	,	0	1	0	-1	0		
	-4	71, ·	1 .), i		0	0	- 2	-1		
	Zj -	Cj	•		0	0	0	11	4		
	Man	ratio									

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```
.. Y Z; - C; >0 and Y MB; >0
      :: Current solution is optimal solution
        : n, =1
           212 =1
        : Zman = -4(1) - 3(1)
       = -7
\therefore | Z_{man} = -7 |
Q2 Use dual simplen method to solve the following LPP.
         Manimize Z = -4n_1 - 3n_2
                     n1 + n2 61
                     212 >1
                     -n, +2n2 6 1
                     M, n2 >0
       Manimize Z = -Un_1 - 3n_2
ANS
                   n, + n2 41
                   - M2 4 -1
                 -M1 + 2M2 &1
                    MI, M2 >0
     Standard form:
           Manimize Z = -491, -3912 + Os, + Os2 + Os3
                      n_1 + n_2 + s_1 = 01
                      - M2 + S2 = -1
                      -M_1 + 2M_2 + S_3 = 1
                      91, 7/2 >, 0 [Basis variables]
                      Si, Sz, Sz >,0 [Slack variables]
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;									
	ITER	ATION .	1 %	,					
				-4	-3	D	· O	0	
	CB	NB	solution	21	712	Sı	S ₂	83	
	0	Sı	1	1	J		0	0	
	0		-	Ō	(-1)	D	1	0>	
	0	S ₃	1	-	2	0	0	1	
	zj	- C;		4	3	0	O	0	
	Man	ratio		_	-3	- ·	_		
					<u> </u>				
	• •	∀ Zj - C	5 7,0	but t	1 NB; 7	0			
	TI		nt itexation						
		S2 (8	departing	y varia	ble				
		712 (3	entering	varia	ble .				
		-1 is	entering key el	ement					
		+							
	+	ATION 2							j.
J1	+	C;					0		
	1		solution				0,7		
	0	Sı			0		1	0	
	-3	S ₂	-	0		0	-1	0	
	0	S 3	1	(-1)	0	0	2 3	0	
		7g - Cg	,	-y	0	0	ے 		
	Man	n ratio		<u>−</u>		2			
		¥ 7: - 0	70	but	Y Mai	*.0			
	††				V 1/18)				
	Some iteration, Some iteration, Some is departing variable The is entering variable								
		1 68 KB	y eleme	ent	18				
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	MERAT		3:	1	-3	D	. 0	0				
		G			71 ₂		82	S3				
	CB		solution	711		<u> </u>	3					
		Sı		0	0	0	<u> </u>	0				
		7/2		0	0	0	-2	-1				
-	4	η,	1		0	0	()	4				
	Zj	- Cj		0			_					
	Man 1	Ratio				-						
					V 01 : V	4.0						
0	°° Y Z; - C; >,0 but Y NB; ≯0											
	and Man reatio cannot be jound.											
	: key now has all +ve elements											
	Given LPP is unbounded											
	i.e. No jeasable solution.											
Q 3	use duality to solve the LPP											
	Minin	mize	Z = 7									
		,	M, +									
			- 21, -									
			711,	$\gamma_2 \geq 0$)							
ANS	М	animiz	e T=	24,+	y ₂	, D. 10 +0	α.]					
	3/t y1- y2 21 [bue w n1]											
	y, - y2 5-1 [Due to M2]											
		1 -			6	1		P				
	Standard Form:											
	Maximize 7 = 2y, + y2											
	$8/t$ $y_1 - y_2 \le 1$ $-y_1 + y_2 > 1$											
	y, y2 7, O											

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Mam $T = 2y_1 + y_2 + 0m_1 + 0m_2 - ma_1$ S/t $y_1 - y_2 + 9c_1 = 1$ $-y_1 + y_2 - y_2 + a_1 = 1$ $y_1, y_2 > 0$ [Basic variable] $9c_1 > 0$ [Slack Variable] $9c_2 > 0$ [Slack variable] $9c_3 > 0$ [Slack variable] $9c_4 > 0$ [Artificial variable] 0 2 1 0 a, Min Ratio CB MB 801 y, y2 .91, 9/2 \mathcal{O} 0 9(1 1 1 -1 -1 -1 0 -1 Z; - C; m-2 m-1 O m 0 1 D D

y₂ x₁ x₂

0 1 -1 2 Min ratio 0 .. \forall Z; -C; \forall 2 Minimum ratio can't be jound as element of key column are not positive

.. Given LPP has & unbounded collection
i.e. No jeasable solution.