المحاضرة 18 :

مثال :

$$Z = 4X_1 + 5X_2 + X_3 \longrightarrow Max$$

$$3X_1 + 2X_2 \leq 10$$

$$X_1 + 4X_2 \leq 11$$

$$3X_1 + 3X_2 + X_3 \leq 13$$

$$X_1, X_2, X_3 \geq 0 \qquad X_i : \text{Integer } (i = 1:3)$$

	X_1	X_2	X_3	X_4	X_5	X_6	R.h
X_4	3	2	0	1	0	0	10
X_5	1	4	0	0	1	0	11
X_6	3	3	1	0	0	1	13
$-Z$	-4	-5	-1	0	0	0	0
X_4	$10/4$	0	0	0	$-1/2$	0	$\frac{38}{4}$
X_2	$1/4$	1	0	0	$1/4$	0	$11/4$
X_6	$9/4$	0	1	0	$-3/4$	1	$49/4$
$-Z$	$-11/4$	0	-1	0	$5/4$	0	0
X_1	1						
X_2	0						
X_6	0						
$-Z$							
X_1	1	0	0	$2/5$	$-1/5$	0	$9/5$
X_2	0	1	0	$-1/10$	$3/10$	0	$23/10$
X_3	0	0	1	$-9/10$	$3/10$	1	$7/10$

آخر جدول

$-Z$	0	0	0	$\frac{1}{5}$	$2/5$	1	$\frac{97}{5}$

$X_1 = \frac{9}{5} = 1,8 \rightarrow$ اعتباري

$X_2 = \frac{23}{10} = 2,3$

$X_3 = \frac{7}{10} = 0,7$

$\lfloor x \rfloor = 1 \leftarrow x_1 = 1,8 \rightarrow \lceil x \rceil = 2$

$\Rightarrow$ الشرط

F_1 $\quad x_1 \leqslant 1$ $\qquad$ F_2 $\quad x_2 \geqslant 2$

$$X_1 + \frac{2}{5} X_4 - \frac{1}{5} X_5 = \frac{9}{5}$$

$$X_1 + X_7 = 1$$

$$-\frac{2}{5} X_4 + \frac{1}{5} X_5 + \frac{9}{5} + X_7 = 1$$

$$-\frac{2}{5} X_4 + \frac{1}{5} X_5 + X_7 = -\frac{4}{5}$$

$\rightarrow$ نضيفه لآخر سطر في الجدول السابق

F_1

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	
X_1	1	0	0	$2/5$	$-1/5$	0	0	$9/5$
X_2	0	1	0	$-1/10$	$3/10$	0	0	$23/10$
X_3	0	0	1	$9/10$	$-3/10$	1	0	$7/10$
X_7	0	0	0	$-2/5$	$1/5$	0	1	$-4/5$
$-Z$	0	0	0	$1/5$	$2/5$	1	0	$\frac{97}{5}$

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	
X_1	1	0	0	2/5	-1/5	0	0	9/5
X_2	0	1	0	-1/10	3/10	0	0	23/10
X_3	0	0	1	+9/10	-3/10	1	0	7/10
X_7	0	0	0	[1]	-1/2	0	-5/2	2
$-F$	0	0	0	1/5	2/5	1	0	97/5
X_1	1	0	0	0	0	0	1	(1)
X_2	0	1	0	0	1/4	0	-1/4	(5/2)
X_3	0	0	1	0	-3/4	1	-9/4	(5/2)
X_7	0	0	0	[1]	-1/2	0	-5/2	2
$-F$	0	0	0	0	1/2	1	1/2	(19)

الحل $\Rightarrow X_1 = 1 , \ X_2 = 5/2 , \ X_3 = 5/2$

$F_1 = \underline{19}$

الفرع الثاني F_2 شرط ال $X_1 \geq 2$

$$-X_1 + X_7 \leq -2$$

$$X_1 + \frac{2}{5} X_4 - \frac{1}{5} X_5 = \frac{9}{5}$$

$$-X_1 - \frac{2}{5} X_4 + \frac{1}{5} X_5 = -\frac{9}{5}$$

$$-X_1 = \frac{2}{5} X_4 - \frac{1}{5} X_5 - \frac{9}{5}$$

$$\frac{2}{5}x_4 - \frac{1}{5}x_5 - \frac{9}{5} + x_7 = -2$$

$$\Rightarrow \boxed{\frac{2}{5}x_4 - \frac{1}{5}x_5 + x_7 = -\frac{1}{5}}$$

F2

	x_1	x_2	x_3	x_4	x_5	x_6	x_7	
x_1	1	0	0	2/5	-1/5	0	0	9/5
x_2	0	1	0	-1/10	3/10	0	0	23/10
x_3	0	0	1	-9/10	-3/10	1	0	7/10
x_7	0	0	0	2/5	(-1/5)	0	1	-1/5
-z	0	0	0	1/5	2/5		0	97/5

اخترنا هذا العمود لأن العمود الرابع ما بيضبط

	x_1	x_2	x_3	x_4	x_5	x_6	x_7	
x_1	1	0	0	2/5	-1/5	0	0	9/5
x_2	0	1	0	-1/10	3/10	0	0	23/10
x_3	0	0	1	-9/10	-3/10	1	0	7/10
x_5	0	0	0	-2	[1]	0	-5	1
	0	0	0	1/5	2/5	1	0	97/5

	x_1	x_2	x_3	x_4	x_5	x_6	x_7	
x_1	1	0	0	0	0	0	-1	2
x_2	0	1	0	1/2	0	0	3/2	2
x_3	0	0	1	-3/2	0	1	-3/2	1
x_5	0	0	0	-2	[1]	0	-5	
	0	0	0	1	0	1	2	(19)

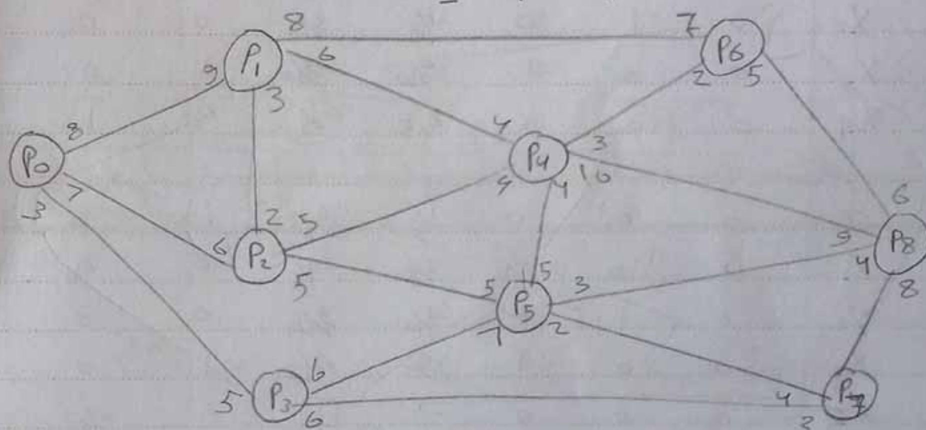
$F = 19$, $x_1 = 2$, $x_2 = 2$, $x_3 = 1$

وهو المطلوب

المحاضرة 19 :

ص.ص.ص

لتكن لدينا شبكة النقل التالية :



المطلوب ايجاد الحل الأمثل لنقل أكبر كمية من $P_0 \rightarrow P_8$

	P0	P1	P2	P3	P4	P5	P6	P7	P8
P0		9	6	5					
P1	8		2		4		7		
P2	7	3			4	5			
P3	3					7		3	
P4		6	5			5	2		9
P5			5	6	4			4	4
P6		8			3				6
P7				6		2			8
P8					10	3	5	7	

مطلوب: أقصر طريقة $P_0 \leftarrow P_8$

أعظم تدفقة $P_0 \leftarrow P_5$