LINEAR PROGRAMMING

Introduction.

Optimization : Mathematical programming : البرمجة الرياضية

Maxing and minima.

If we have $y = f(x)$ at the point of maxima,

$$y' = 0 \qquad \text{.....(1)}$$

$$y'' \qquad \text{.....(2)} \text{ is the (-ive)}$$

At the point of minima:

$$y' = 0 \qquad \text{.....(1)}$$

$$y'' \qquad \text{.....(2)} \text{ is the (+ive)}$$

Definition:

Suppose $x_1 , x_2 , \dots , x_n$ be the points of maxima of the function $y = f(x)$, then out of these points let x_i be the point at which the value of y is largest then the point x_i is called ***global-max***. **i.e.** "The point of global maxima is the point when the value of the function is largest over the whole range of x".

The other points of maxima is called point of ***local maxima***.

Definition:

Similarly we may define the point of local miniming the points at which the value of y is least is called ***global-min***.

Definition:

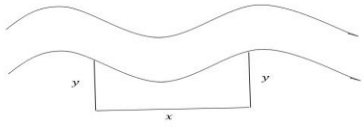
الدالة بدلالة المتغير الواحد $[a \le x \le b]$

Let $y = f(x)$, $a \le x \le b$ if this function has one point of max (or one point of minima) in the rang $[a , b]$, then $f(x)$ is called ***auni-model*** function of x.

بعض التطبيقات لبناء نماذج في البرمجة الخطية

Example :

Consider the figure below, it is seen that the length of fence is $(z\,y + x)$ suppose that the total cost of fence is z, suppose that (c) is the cost meter, then $Z = c(z\,y + x)$.



where the area $A = x\ y$, here we have an optimization problem :

minimize $Z = c(z\,y + x)$ .....(1)

Subject to $A = x\ y$ .....(2)

and $x \succ 0\ ,\ y \succ 0$ .....(3)

ملاحظة مهمة : لا يوجد قياس متري سالب.

$A = x\ y \longrightarrow y = A/x$

$Z = c(x + \frac{2A}{x})$, $\frac{dz}{dx} = 0$ (المشتقة)

$x = \sqrt{2A}$ (الطول)

$y = \sqrt{A/2}$ (العرض)

دالة الهدف

القيود أو الشروط } تمثل معنى المعادلات الثلاث اعلاه

شروط اللاسالبية

مسائل البرمجة الخطية { الخطية (Lpp) ، اللاخطية (Npp)

Example : Consider

		(A)	(B)	(C)
200	(M_1)	2	1	2
400	(M_2)	4	-	3
300	(M_3)	3	2	1
200	(M_4)	1	4	1
		$4D$	$2D$	$3D$

نفرض أن x_1 عدد البضائع المنتجة من صنف (A).

نفرض أن x_2 عدد البضائع المنتجة من صنف (B).

نفرض أن x_3 عدد البضائع المنتجة من صنف (C).

$$Max \quad z = 4x_1 + 2x_2 + 3x_3$$ (دالة الهدف)

$$\left.\begin{array}{l} 2x_1 + x_2 + 2x_3 \le 200 \\ 4x_1 + 3x_3 \le 400 \\ 3x_1 + 2x_2 + x_3 \le 300 \\ x_1 + 4x_2 + x_3 \le 200 \end{array}\right\}$$ (القيود)

$$x_1 \ge 0 \ , \ x_2 \ge 0 \ , \ x_3 \ge 0$$ (الشروط اللاسالبية)