

0.5

Numerical

ثانية مدني

المحاضرة رقم { 6 }

SeRelax
Team

(1)

Lec.6

Curve Fitting cont.

$$\begin{aligned}\sum y_i &= n a_0 + a_1 \sum x_i \\ \sum y_i x_i &= a_0 \sum x_i + a_1 \sum x_i^2\end{aligned} \rightarrow \text{حذف}$$

$$y = a_0 + a_1 X \rightarrow \text{General form}$$

* أي معادلة عندئذ لازم احوالها لا (General form)

$$EX) \cdot y = \alpha e^{\beta x}$$

$$\ln y = \ln \alpha + \beta x$$

$$Y = a_0 + a_1 X$$

XY	X^2	$Y = \ln y$	y	X
✓	✓	✓	✓	✓
✓	✓	✓	✓	✓
✓	✓	✓	✓	✓
✓	✓	✓	✓	✓
$\sum XY$	$\sum X^2$	$\sum Y$		$\sum X$

$$\begin{aligned}\sum Y_i &= n a_0 + a_1 \sum x_i \\ \sum Y_i x_i &= a_0 \sum x_i + a_1 \sum x_i^2\end{aligned}$$

* يتم حل المسألة لايجاد " a_0, a_1 " وبعد كدة بحسب " α, β " الى
كانوا في المسألة الاصلية

$$* \ln \alpha = a_0$$

$$* \beta = a_1$$

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$$EX) :- y = \alpha x^\beta$$

$$(\ln y) = (\ln \alpha) + \beta (\ln x)$$

$$Y = a_0 + \beta X$$

$$\sum Y_i = n a_0 + \beta \sum X_i$$

$$\sum Y_i X_i = a_0 \sum X_i + \beta \sum X_i^2$$

X	y	X = ln x	Y = ln y	X ²	XY
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓
		$\sum X$	$\sum Y$	$\sum X^2$	$\sum XY$

$$EX) :- y = \alpha \frac{x}{\beta + x}$$

$$\frac{1}{y} = \frac{\beta + x}{\alpha x}$$

$$\frac{1}{y} = \frac{1}{\alpha} + \frac{\beta}{\alpha} * \frac{1}{x}$$

$$Y = a_0 + a_1 X$$

X	y	X = 1/x	Y = 1/y	X ²	XY
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓
		$\sum X$	$\sum Y$	$\sum X^2$	$\sum XY$

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EX(2-2) :-

X	y	$X = \ln x$	$Y = \ln y$	X^2	XY
0.2	0.196	✓	✓	✓	✓
0.4	0.783	✓	✓	✓	✓
0.6	1.7665	✓	✓	✓	✓
0.8	3.1405	✓	✓	✓	✓
1	4.9076	✓	✓	✓	✓
		-3.2596	1.4325	3.7406	2.2985

→ (n=5)

$$y = \alpha X^\beta$$

$$\ln y = \ln \alpha + \beta \ln X$$

$$Y = a_0 + a_1 X$$

$$\sum Y_i X_i = a_0 \sum X_i + a_1 \sum X_i^2$$

$$\sum Y_i = n a_0 + a_1 \sum X_i$$

$$2.2985 = -3.2596 a_0 + 3.7406 a_1 \quad \leadsto (1)$$

$$1.4325 = 5 a_0 - 3.2595 a_1 \quad \leadsto (2)$$

from (1) & (2)

$$a_0 \approx 1.6, \quad a_1 \approx 2$$

$$Y = 1.6 + 2X$$

$$\ln \alpha = 1.6 \leadsto \alpha = 4.95, \quad a_1 = \beta = 2$$

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EX (3-2):-

$$T = a + bt$$

$$\sum T = na + b \sum t$$

$$\sum T \times t = a \sum t + b \sum t^2$$

* الاختلاف في المسألة دي تغيير الرموز $a \rightarrow q_0, t \rightarrow x, T \rightarrow y$ و $b \rightarrow a_1$ و اشتغل المسألة عادى جداً

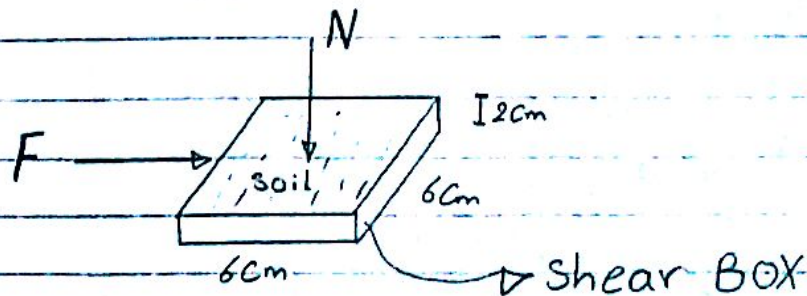
EX (3-6):- Very Important

any soil has $\rightarrow C$: Cohesion
 $\rightarrow \phi$: internal friction

* Bearing Capacity (B.C.): "قدرة تحمل التربة"

* مشاتن اقدر اعرف التربة اللي عندي دي تقدر تشيل احمال ادايه
في عملية البناء لازم اعرف (B.C) بنيتها و اللي بتحدد من (C, ϕ)
بتوع التربة نفسها و بحد الكلام من تجربة (D.S.B.)

* Direct shear BOX Exp. "D.S.B":-



* بآثر على التربة ب (Normal Load/shear load) لحد ما اوصل Failure
بتاع التربة واسجل ارقام ال Loads

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N	F	$\sigma = \frac{N}{A}$	$\tau = \frac{F}{A}$
18	11.52	✓	✓
36	15.84	✓	✓
54	20.16	✓	✓

$$\tau = C + \sigma \tan \phi$$

General form of the equation is
 $y = a_0 + a_1 x$

where:-

τ : shear strength. = F/A .

σ : Normal stress. = N/A .

C : Cohesion.

ϕ : internal friction.

$$A = 36 \text{ cm}^2$$