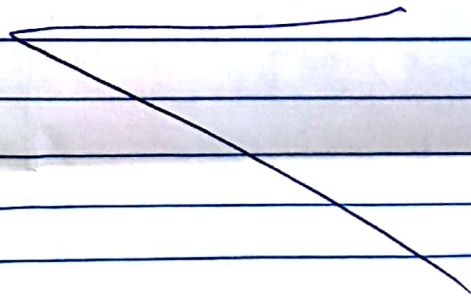


مؤرخ ايجامه

حاقه / الاقصاد الرصيع

د. طاهر فرحاته



Q₁ (a)

X	y	XY	X ²	y ²
10	50	500	100	2500
11	38	418	121	1444
14	35	490	196	1225
15	42	630	225	1764
20	44	880	400	1936
25	39	975	625	1521
46	30	1380	2116	900
50	55	2750	2500	3025
59	52	3068	3481	2704
70	40	2800	4900	1600
<u>320</u>	<u>425</u>	<u>13891</u>	<u>14664</u>	<u>18619</u>

$$\bar{X} = \frac{320}{10} = 32$$

$$\bar{y} = \frac{425}{10} = 42.5$$

$$B^{\wedge} = \frac{n \sum XY - \sum X \sum y}{n \sum X^2 - (\sum X)^2} = 0.066$$

$$B_0 = \bar{y} - B^{\wedge} \bar{X} = 40.395$$

$$y^{\wedge} = B_0 - B^{\wedge} X$$

$$y^{\wedge} = 40.395 - 0.066X$$

$$y^{\wedge} = 40.395 - 0.066X = 37.1$$

at X = 50

$$e^{\wedge} = y - y^{\wedge} = 55 - 37.1 = 17.9$$

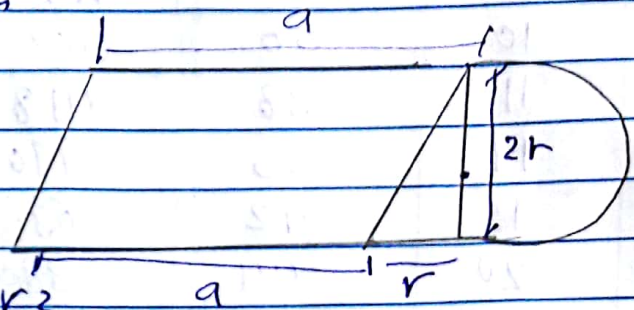
(b)

$$a = (50.3 \pm 0.1) \text{ m}$$

$$r = (9.50 \pm 0.2) \text{ m}$$

The area $A = \frac{a+a}{2} (2r)$

$$+ \frac{1}{2} (r \times 2r) + \frac{1}{2} \pi r^2$$



$$= 2ar + r^2 + \frac{1}{2} \pi r^2$$

$$\textcircled{1} \frac{\partial A}{\partial a} = 2r$$

$$\textcircled{2} \frac{\partial A}{\partial r} = 2a + 2r + \pi r$$

} $\frac{\partial A}{\partial a} = 2r$
 $\frac{\partial A}{\partial r} = 2a + 2r + \pi r$

$$\sigma_{\text{Area}}^2 = \sigma_a^2 \left(\frac{\partial A}{\partial a} \right)^2 + \sigma_r^2 \left(\frac{\partial A}{\partial r} \right)^2$$

the most probable value of Area

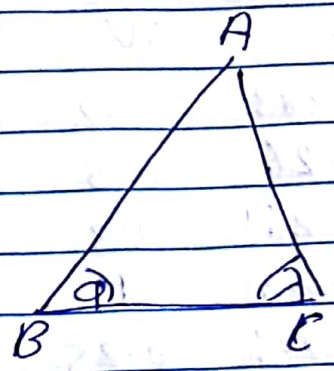
$$= A \pm \sigma$$

(C)

$$AB = 400.2 \pm 0.019$$

$$\lambda = 45^\circ 20' 14'' + 20''$$

$$\phi = 52^\circ 3' 45'' \pm 20''$$



Solu.

$$\frac{AB}{\sin \lambda} = \frac{AC}{\sin \phi}$$

لغير الخوض.

$$AC = AB \frac{\sin \phi}{\sin \lambda} = (443.765 \text{ m})$$

$$\sigma_{AC}^2 = \sigma_{AB}^2 \left(\frac{\partial AC}{\partial AB} \right)^2 + \sigma_{\phi}^2 \left(\frac{\partial AC}{\partial \phi} \right)^2 + \sigma_{\lambda}^2 \left(\frac{\partial AC}{\partial \lambda} \right)^2$$

$$\frac{\partial AC}{\partial AB} = \frac{\sin(\phi)}{\sin \lambda}$$

$$\frac{\partial AC}{\partial \phi} = AB \frac{\cos \phi}{\sin \lambda}$$

$$\frac{\partial AC}{\partial \lambda} = AB \sin \phi \cdot \left(\frac{-\cos \lambda}{\sin^2 \lambda} \right)$$

$$\sigma_{AC}^2 = (0.019)^2 (1.11)^2 + \left(\frac{20}{206265} \right)^2 (-438.57)^2 + \left(\frac{20}{206265} \right)^2 (34593)^2$$

$$\Rightarrow \sigma_{AC} = 0.34$$

the most probable value of AC = 443.765 ± 0.034

Q2

R-L	w	(X- \bar{X})	(X- \bar{X}) ²	(X- \bar{X}) ² w
156-283	0.2	-0.491	0.2411	0.048
157-26	0.5	0.486	0.2362	0.1181
158-26	1/3	1.486	2.208	0.7361
156-258	1	-0.516	0.266	0.266
156-276	0.25	-0.498	0.248	0.062
				<u>1.23</u>

$$\bar{X} = \frac{\sum Xw}{\sum w}$$

بعد التوزيع

$$\bar{X} = 156.774$$

$$\sigma^2 = \frac{\sum (X-\bar{X})^2 w}{n-1} = 0.5546$$

$$3\sigma = 1.664 \quad \text{و} \quad -3\sigma = -1.664$$

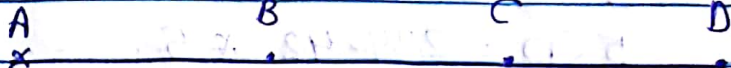
نطاق CL بعد التوزيع

$$\sigma_m = \frac{\sigma}{\sqrt{\sum w}} = \frac{0.5546}{\sqrt{2.28}} = \pm 0.367$$

$$Y_m = 0.6745\sigma_m = \pm 0.2476$$

The most probable value = 156.774 ± 0.2476

P3 (b)



$$AB = 153.64$$

$$w = 4$$

$$BC = 215.17$$

$$w = 3$$

$$CD = 289.42$$

$$w = 5$$

$$AB + BC = 368.89$$

$$w = 2$$

$$BC + CD = 504.55$$

$$w = 3$$

$$AB + BC + CD = 658.29$$

$$w = 1$$

For AB

$$4 AB = 4 \times 153.64$$

$$2 AB + 2 BC = 2 \times 368.89$$

$$AB + BC + CD = 658.29$$

$$7 AB + 3 BC + CD = 2010.63 \rightarrow \textcircled{1}$$

For BC

$$3 BC = 3 \times 215.17$$

$$2 AB + 2 BC = 2 \times 368.89$$

$$3 BC + 3 CD = 3 \times 504.55$$

$$AB + BC + CD = 658.29$$

$$3 AB + 9 BC + 4 CD = 3555.23 \rightarrow \textcircled{2}$$

For CD

$$5CD = 289.42 \times 5$$

$$3BC + 3CD = 3 \times 504.44$$

$$AB + BC + CD = 658.29$$

$$AB + 4BC + 9CD = 3618.71 \quad \rightarrow \textcircled{3}$$

From (1) (2) (3)

$$AB = 153.668 \text{ m}$$

$$BC = 215.198 \text{ m}$$

$$CD = 289.361$$

Correlatives method

Let

$$AB = 153.64 + V_1$$

$$BC = 215.17 + V_2$$

$$CD = 289.42 + V_3$$

$$\therefore V_1 = 0$$

$$V_2 = 0$$

$$V_3 = 0$$

$$V_1 + V_2 = 0.08$$

$$V_2 + V_3 = -0.04$$

$$V_1 + V_2 + V_3 = 0.08$$

$$w = 4$$

$$w = 3$$

$$w = 5$$

$$w = 2$$

$$w = 3$$

$$w = 1$$

For V_1

$$4V_1 = 0$$

$$2V_1 + 2V_2 = 2 \times 0.08$$

$$V_1 + V_2 + V_3 = 0.06$$

$$7V_1 + 3V_2 + V_3 = 0.22 \rightarrow (1)$$

For V_2

$$3V_2 = 0$$

$$2V_1 + 2V_2 = 2 \times 0.08$$

$$3V_2 + 3V_3 = 3 \times 0.04$$

$$V_1 + V_2 + V_3 = 0.06$$

$$3V_1 + 9V_2 + 4V_3 = 0.1 \rightarrow (2)$$

For V_3

$$5V_3 =$$

$$3V_2 + 3V_3 = 3 \times 0.4$$

$$V_1 + V_2 + V_3 = 0.06$$

$$V_1 + 4V_2 + 9V_3 = -0.06 \rightarrow (3)$$

From (1) (2) (3)

$$V_1 = 0.0313$$

$$V_2 = -9.245 \times 10^{-4}$$

$$V_3 = 3.599 \times 10^{-3}$$

$$\therefore AB = 153.64 + V_1 = 153.67$$

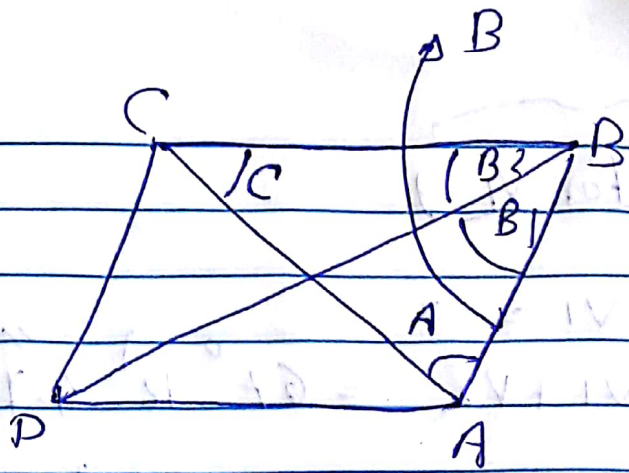
$$BC = 215.17 + V_2 = 215.169$$

$$CD = 289.42 + V_3 = 289.424$$

#

a)

For Triangle ABE



$$A = 48^{\circ} 1' 17''$$

$$B_2 = 67^{\circ} 12' 8''$$

$$B_1 = 56^{\circ} 34' 2.4''$$

$$B = B_1 + B_2 = 123^{\circ} 46' 5.6''$$

$$C = 75^{\circ} 24' 42.1''$$

$$2 = 1 - 3 = 2/6/16$$

$$2 = 1 - 3 = 2/6/16$$

Let

$$A = 48^{\circ} 1' 17'' + V_1$$

$$C = 75^{\circ} 24' 42.1'' + V_2$$

$$B = 180 - (A + C)$$

$$B = 56^{\circ} 34' 9'' - V_1 + V_2$$

$$V_1 = 0$$

$$V_1 + V_2 = 67^{\circ} 12' 4.7''$$

$$V_2 = 0$$

For V_1

$$V_1 = 0$$

$$V_1 + V_2 = 67^\circ 12' 4.7''$$

$$2V_1 + V_2 = 67^\circ 12' 4.7'' \rightarrow \textcircled{1}$$

For V_2

$$V_1 + V_2 = 67^\circ 12' 4.7''$$

$$V_2 = 0$$

$$V_1 + 2V_2 = 67^\circ 12' 4.7'' \rightarrow \textcircled{2}$$

Form $\textcircled{1}$ & $\textcircled{2}$

$$V_1 = 22^\circ 24' 1.57''$$

$$V_2 = 22^\circ 24' 1.57''$$

$$A = 418^\circ 1' 17'' + 22^\circ 24' 1.57''$$

$$A = 70^\circ 25' 18.57'' \rightarrow *$$

$$B = 96^\circ 34' 0.9'' \rightarrow *$$

$$C = 53^\circ 0'' 40.53'' \rightarrow *$$

end section
↓