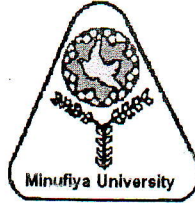


Menoufiya University
Faculty of Engineering
Shebin El-Kom
Academic Year: 2013-2014



Department: Civil
Subject/Code: Adjustment of
Observations
Time Allowed: 3 hours
Date: 8 / 6 / 2014

Answer all the following Questions [100 Marks]

Question (1)

[15]

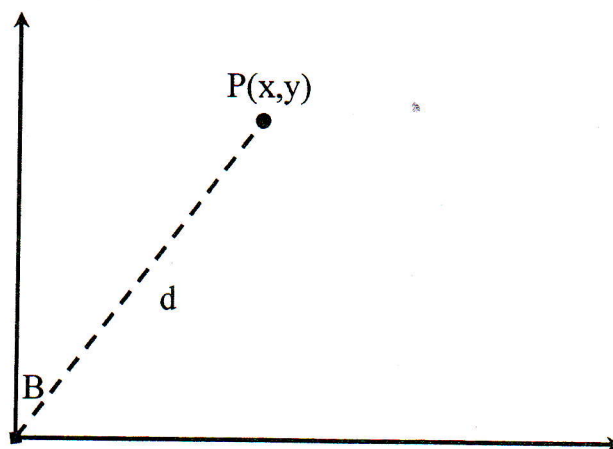
Two sides and the included angle were measured with the following results: $AB = 155.25 \pm 0.03$ m; $BC = 71.25 \pm 0.02$ m and $ABC = 40^\circ 20' \pm 20$ Sec. Compute the most probable value of area of triangle ABC?

Question (2)

[25]

Consider a point P of unknown coordinates (x, y) that are required to be determined. This can be done by measuring the distance (d) and bearing (B) of P from a fixed known point $P_o (x_o, y_o)$, with the following results:

$$x_o = 500 \text{ m}, y_o = 700 \text{ m}, d = 200 \text{ m}, \sigma_d = 2.0 \text{ cm}, B = 30^\circ \text{ and } \sigma_B = 3'$$



Fixed point $P_o (x_o, y_o)$

Question (3)

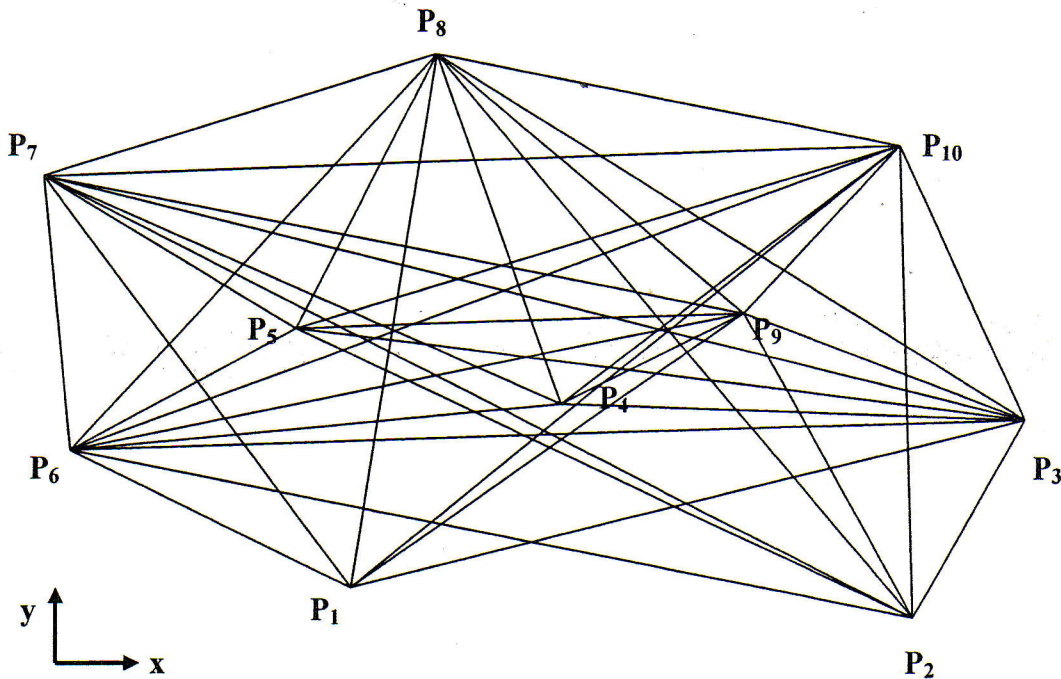
[25]

Consider the shown rectangular piece of land, whose area = A and its diagonal length = C are required to be determined along with their precision. This is done by measuring its length = a and its width = b, with the following results: $a = 400$ m and $b = 300$ m. The relative error in the measured distances was found to be 10 ppm. The correlation between a and b is assumed to be 50 % ?

Question (4)

[35]

A two-dimensional trilateration network comprising ten points (20 coordinates). The approximate coordinates are listed (P_1, P_2, P_4 and P_5 are fixed points). Compute the design matrix (A)? It is assumed that an EDM instrument will be used to measure all the distances with achievable accuracy $\sigma_s^2 = (0.5 \text{ mm})^2 + (1 \text{ ppm} \cdot S)^2$ where S is the distance computed from the approximate coordinates.



The approximate coordinates of network points

Points	The approximate coordinates of netpoints	
	x (m)	y (m)
P ₁	2000	1000
P ₂	5000	100
P ₃	5400	2600
P ₄	3000	3000
P ₅	1800	4600
P ₆	400	2600
P ₇	200	6000
P ₈	2000	7000
P ₉	4000	5000
P ₁₀	5000	7000

Best Wishes: Dr/ Mohamed Ismail مع أطيب التمنيات بالتوفيق