“Complementi di Fisica e Analisi Dei Dati Sperimentali Per La Geologia”

prima prova in itinere 18/11/2015 - SOLUZIONI

Esercizio 1

x_i

59.4	58.0	57.7	57.5	58.3	59.2	59.1

$x_i - \bar{x}$:

0,943	0.457	0.757	0.957	0.157	0,743	0.643

$(x_i - \bar{x})^2$:

0,88925	0.2088	0.57305	0.91585	0.02465	0,55205	0.41345

$\bar{L} = \sum x_i / N = 58.46\ m$; $\sigma = \sqrt{\frac{\sum (x_i - \bar{x})^2}{N-1}} = [3{,}577/6\ ]^{1/2}$ $\sigma = 0.77$ [$\sigma_{\bar{x}} = \sigma/\sqrt{N} = 0.3$]

$L \pm \Delta L = 58.5 \pm 0.8\ m$

Esercizio 2

$[\Delta L/L]_{sist} = 0.03$; $[\Delta L]_{sist} = 1.76$;

$[\Delta L]_{tot} = \sqrt{\Delta L_{cas}^2 + \Delta L_{sist}^2} = \sqrt{0.8^2 + 1.8^2} =$ **1.9 *m*** [$\sqrt{\Delta L_{cas}^2 + \Delta L_{sist}^2} = \sqrt{0.3^2 + 1.8^2} =$ **1.8 *m***]

$L \pm \Delta L = 58.5 \pm 2.0\ m$

Esercizio 3

822 ± 39 = **820 ± 40**

7186 ± 324 = **7200 ± 300**

15969 ± 143 = **15970 ± 140**

373,8776 ± 0,0146 = **373,878 ± 0.015**

83,7988± 0,061 = **83,80 ± 0.06**

516,79 ± 0,067 = **516,79 ± 0.07**

3784 ± 51 = **3780 ± 50**

52,773980 ± 0,08578 = **52,77 ± 0.09**

Esercizio 4

[A = (220 ± 3) *m*; a = (75 ± 3) *m*; h = (30 ± 1) *m*]

C = (A+a) / 2; C = 147,5 *m* ; $\overline{D}$ = C·h; $\overline{D}$ = 4425 *m*;

$$\Delta C = \frac{1}{2}\sqrt{(\Delta A)^2 + (\Delta a)^2} \qquad \frac{\Delta D}{D} = \sqrt{\left(\frac{\Delta C}{C}\right)^2 + \left(\frac{\Delta h}{h}\right)^2} \qquad \Delta D = \sqrt{(h \cdot \Delta C)^2 + (C \cdot \Delta h)^2}$$

ΔC = 2.12*m* ; Δh = 1*m* ; $\overline{D}$ = 4425 m^2; ΔD = 160,627 m^2

A = 4430 ± 160 m^2

Esercizio 5

q = x/y + x^2 + yz ; x = 11 ± 1 ; y = 0.12 ± 0.02 ; z = 9.0 ± 0.5

$$\delta q = \sqrt{\left|\frac{\partial q}{\partial x}\delta x\right|^2 + \left|\frac{\partial q}{\partial y}\delta y\right|^2 + \left|\frac{\partial q}{\partial z}\delta z\right|^2}; \qquad \frac{\partial q}{\partial x} = \frac{1}{y} + 2x; \qquad \frac{\partial q}{\partial y} = -\frac{x}{y^2} + z; \qquad \frac{\partial q}{\partial z} = y$$

$$\left|\frac{\partial q}{\partial x}\delta x\right| = 30.3; \qquad \left|\frac{\partial q}{\partial y}\delta y\right| = 15.1; \qquad \left|\frac{\partial q}{\partial z}\delta z\right| = 0.06$$

q ± δq = 213.7 ± 33.8 arrotondato a: **q ± δq = 210 ± 30**