PHYS 500
HANDOUT 4

1. Measuring the length *L* and the width *d* of an orthogonal parallelogram we got the following recordings (in *mm*):

L	24.25	24.26	24.22	24.28	24.24	24.25	24.22	24.26	24.23	24.24
d	50.36	50.35	50.41	50.37	50.36	50.32	50.39	50.38	50.36	50.38

Calculate the area of the parallelogram and its error with two different ways:

a) From L_i, d_i calculate the average values $\bar{L}$, $\bar{d}$ and their errors δL and δd, and find S and δS.

b) From L_i, d_i calculate each S_i, and from these calculate S and δS.

2. In the following examples calculate Z and δZ:

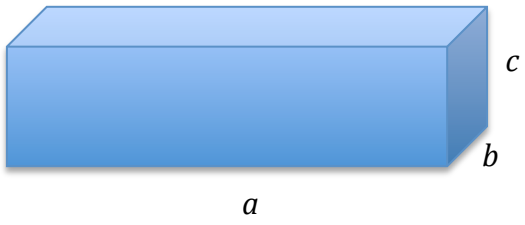
a) $Z = A^2, \quad A = 25 \pm 1$, b) $Z = A - 2B, \quad A = 100 \pm 3, \; B = 45 \pm 2$

c) $Z = \dfrac{A\left(C^2 + D^{3/2}\right)}{B}, \; A = 0.100 \pm 0.003, \; B = 1.00 \pm 0.05,$
$C = 50.0 \pm 0.5, \; D = 100 \pm 8$

d) $Z = A \ln B, \; A = 10.00 \pm 0.06, \; B = 100 \pm 2$

e) $Z = 1 - \dfrac{1}{A}, \quad A = 50 \pm 2$.

3. We measure the sides and the mass of the metallic slab, shown in figure below and we found: $M = (135.00 \pm 0.10)\,gr$, $a = (80.0 \pm 1.0)\,mm$, $b = (10.0 \pm 1.0)\,mm$, $c = (20.00 \pm 0.10)\,mm$.



It is known that the moment of inertia of this body for an axis passing from the centre of the face *ab* and perpendicular to it is given by $I = (1/12)M\left(a^2 + b^2\right)$. Calculate the relative error (in %) of (a) the density of the slab and (b) of the moment of inertia of the slab.