

## MATH2 : Correction rapide du CC3 du 15 juin 2015.

**Exercice 1.** Notons  $a = AB$ ,  $b = AC$  et  $c = BC$ .

1. Bien évidemment,  $c = \sqrt{a^2 + b^2}$  et

$$\frac{\partial c}{\partial a}(a, b) = \frac{2a}{2\sqrt{a^2 + b^2}} = \frac{a}{c}, \quad \frac{\partial c}{\partial b}(a, b) = \frac{2b}{2\sqrt{a^2 + b^2}} = \frac{b}{c}, \quad \Delta c = \frac{a}{c} \Delta a + \frac{b}{c} \Delta b.$$

Les calculs donnent

$$c = 7.9479872, \quad \Delta c = 0.0223201, \quad \frac{\Delta c}{c} = 0.2808273\%, \quad \text{soit } c = 7.95 \pm 0.02, \quad \frac{\Delta c}{c} = 0.28\%.$$

2. Puisque  $S = ab/2$ , on a

$$\frac{\partial S}{\partial a}(a, b) = \frac{b}{2}, \quad \frac{\partial S}{\partial b}(a, b) = \frac{a}{2}, \quad \Delta S = \frac{b}{2} \Delta a + \frac{a}{2} \Delta b.$$

Les calculs donnent

$$S = 11.4036, \quad \Delta S = 0.06775, \quad \frac{\Delta S}{S} = 0.5941106\%, \quad \text{soit } S = 11.40 \pm 0.07, \quad \frac{\Delta S}{S} = 0.59\%.$$

**Exercice 2.** La masse volumique du béton est  $\rho = \frac{M}{c^2 l}$ ; on a alors

$$\frac{\partial \rho}{\partial M}(M, c, l) = \frac{1}{c^2 l} = \frac{\rho}{M}, \quad \frac{\partial \rho}{\partial c}(M, c, l) = \frac{-2M}{c^3 l} = -2\frac{\rho}{c}, \quad \frac{\partial \rho}{\partial l}(M, c, l) = \frac{-M}{c^2 l^2} = -\frac{\rho}{l},$$

ce qui conduit à

$$\Delta \rho = \left| \frac{\rho}{M} \right| \Delta M + \left| -2\frac{\rho}{c} \right| \Delta c + \left| -\frac{\rho}{l} \right| \Delta l = \frac{\rho}{M} \Delta M + 2\frac{\rho}{c} \Delta c + \frac{\rho}{l} \Delta l.$$

Les calculs donnent

$$\rho = 2464.7059, \quad \Delta \rho = 131.21972, \quad \frac{\Delta \rho}{\rho} = 5.3239506\%, \quad \text{soit } \rho = 2500 \pm 100, \quad \frac{\Delta \rho}{\rho} = 5.3\%.$$