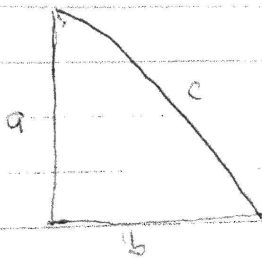


SIMON BOLIVET DION

CIVIL ENG

17/ENG03/051

i)



$$\text{Area} = \frac{1}{2} \cdot b \cdot h = \frac{1}{2} \cdot b \cdot a = \frac{b \cdot a}{2}$$

$$\frac{\delta A}{\delta a} = \frac{b}{2}, \quad \frac{\delta A}{\delta b} = \frac{a}{2}$$

$$\therefore \delta A = \frac{\delta A}{\delta a} \cdot \delta a + \frac{\delta A}{\delta b} \cdot \delta b$$

$$\delta A = \frac{b}{2} \cdot 1.5a + \frac{a}{2} \cdot 1.5b$$

$$= \frac{b}{2} \times \frac{\pm 1.5a}{100} + \frac{a}{2} \times \frac{\pm 1.5b}{100}$$

$$\pm 1.5\% = \left(\frac{3}{2} \div 100\right)b$$
$$= \frac{3b}{200}$$

$$\frac{b}{2} \left(\frac{\pm 3b}{200}\right) + \frac{a}{2} \left(\frac{\pm 3a}{200}\right)$$

$$= \frac{\pm ab}{2} \left[\frac{3}{200} + \frac{3}{200}\right]$$

$$= \frac{\pm ab}{2} \left(\frac{3}{200} + \frac{3}{200}\right)$$

$$= \pm A \left(\frac{3}{100}\right)$$

$$\therefore \Delta A = \pm 3\% A \quad (\delta A = \pm 3\%)$$

b) $c = \sqrt{a^2 + b^2} = (a^2 + b^2)^{1/2}$

$$\therefore \frac{\delta c}{\delta a} = \frac{1}{2} (a^2 + b^2)^{-1/2} \cdot 2a \left(\frac{dc}{du} \times \frac{du}{da}\right)$$

$$u = (a^2 + b^2)$$

$$\frac{du}{da} = 2a$$

$$\therefore \frac{dc}{db} = \frac{1}{2} (a^2 + b^2)^{-1/2} \cdot 2b = \frac{b}{\sqrt{a^2 + b^2}}$$

$$= \frac{(a^2 + b^2)^{-1/2} \cdot 2a}{2}$$

$$da = \frac{+3a}{200}, \quad db = \frac{+3b}{300}$$

$$dc = \frac{dc}{da} \cdot da + \frac{dc}{db} \cdot db$$

$$= \left(\frac{a}{\sqrt{a^2 + b^2}} \cdot \frac{+3a}{200} \right) + \left(\frac{b}{\sqrt{a^2 + b^2}} \cdot \frac{+3b}{300} \right)$$

$$= \frac{3}{200} \left(\frac{a^2 + b^2}{\sqrt{a^2 + b^2}} \right)$$

$$= \frac{3}{200} \left(\frac{c^2}{c} \right)$$

$$= \frac{3}{200} (c)$$

$$dc = 1.5\% \text{ of } c$$