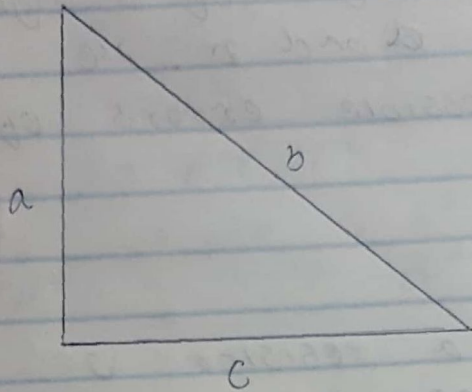


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17/ENG03/004

CIVIL ENGINEERING

ENG 281



Recall that $A = \frac{1}{2}ba$

$$h = \sqrt{a^2 + b^2}$$

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

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

$$\delta b = \frac{\pm 1.5}{100} \times b$$

$$= \frac{\pm 3 \cdot b}{200}$$

$$\delta a = \frac{\pm 1.5}{100} \times a$$

$$= \frac{\pm 3 \cdot a}{200}$$

$$= \frac{b}{2} \cdot \frac{\pm 3b}{200} + \frac{a}{2} \cdot \frac{\pm 2a}{200}$$

$$= \frac{3ab}{2} \left(\pm \frac{1}{200} + \pm \frac{1}{200} \right)$$

$$= \frac{3ab}{2} \left(\pm \frac{1}{100} \right)$$

$$\text{Area} = \frac{ab}{2}$$

$$\Delta A = \left(\pm \frac{1}{100} \right)$$

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

$\therefore \Delta$ increases and decreases by 3%

$$\delta h = \frac{\partial h}{\partial a} \cdot \delta a + \frac{\partial h}{\partial b} \cdot \delta b$$

$$h = (a^2 + b^2)^{1/2}$$

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

$$h = u^{1/2}$$

$$\frac{dh}{du} = \frac{1}{2} u^{-1/2} \quad \frac{du}{da} = 2a$$

$$\therefore \frac{dh}{da} = \frac{dh}{du} \cdot \frac{du}{da}$$

$$= \frac{1}{2} u^{-1/2} \times 2a$$

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

$$= \frac{a}{\sqrt{a^2 + b^2}}$$

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

$$= \frac{a^2}{\sqrt{a^2 + b^2}} + \frac{3}{200} + \frac{b^2}{\sqrt{a^2 + b^2}} + \frac{3}{200}$$

$$= \frac{a^2 + b^2}{\sqrt{a^2 + b^2}} \pm \left(\frac{3}{100} \right)$$

$$n = \frac{a^2 + b^2}{\sqrt{a^2 + b^2}}$$

$\therefore n$ increases and decreases by 3%