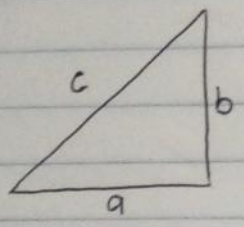
OGBONNA WISDOM OKORO OGONNA
17/ENG03/037
CIVIL ENGINEERING DEPT



$\pm 1.5\%$

since % is maximum possible error we're looking for, well consider both +ve and -ve

$\partial a = \pm 0.015a \qquad \partial b = \pm 0.015b$

a) Area of triangle

Area $(A) = \frac{1}{2}$ base x height $= \frac{ab}{2}$

$\therefore A = \frac{ab}{2}$

$\frac{dA}{da} = \frac{b}{2}$

$\frac{dA}{db} = \frac{a}{2}$

$$\partial A = \frac{dA}{da}\partial a + \frac{dA}{db}\partial b$$

when positive,

$$\partial A = \frac{b}{2}(0.015a) + \frac{a}{2}(0.015b)$$

$$= 0.015\frac{ab}{2} + 0.015\frac{ab}{2}$$

$$= 0.03\frac{ab}{2}$$

where $\frac{ab}{2} = A$.

$\therefore \partial A = 0.03A$

when negative

$$\partial A = \frac{b}{2}(-0.015a) + \frac{a}{2}(-0.015b)$$

$$= -0.015\frac{ab}{2} - 0.015\frac{ab}{2}$$

$$= -0.03\frac{ab}{2}$$

$$= -0.03A$$

$\therefore \partial A = \pm 0.03A$

$\partial A = \pm 3\%$ of A

Charge in hypotenuse (c)

By pythagoras

$c^2 = a^2 + b^2$

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

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

$c = u^{1/2}$

$\frac{du}{da} = 2a \qquad \frac{du}{db} = 2b$

$\frac{dc}{du} = \frac{1}{2} u^{-1/2}$

$$\frac{dc}{da} = \frac{dc}{du} \times \frac{du}{da}$$

$$= (2a)\,\tfrac{1}{2}\,(a^2+b^2)^{1/2}$$

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

$$\frac{dc}{db} = \frac{dc}{du} \times \frac{du}{db}$$

$$= (2b)\,\tfrac{1}{2}\,(a^2+b^2)^{-1/2}$$

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

$$\partial C = \frac{dc}{da}\partial a + \frac{dc}{db}\partial b$$

When positive

$$= \left(\frac{a}{(a^2+b^2)^{1/2}}\right)(0.015a) + \left(\frac{b}{(a^2+b^2)^{1/2}}\right)(0.015b)$$

$$= \frac{0.015a^2 + 0.015b^2}{(a^2+b^2)^{1/2}} = \frac{0.015(a^2+b^2)}{(a^2+b^2)^{1/2}} = \frac{0.015c^2}{c}$$

since $a^2 + b^2 = c^2$

$= 0.015c$

$= 1.5\%$ of c

When negative

$$= \left(\frac{a}{(a^2+b^2)^{1/2}}\right)(-0.015a) + \left(\frac{b}{(a^2+b^2)^{1/2}}\right)(-0.015b)$$

$$= \frac{-0.015(a^2+b^2)}{(a^2+b^2)^{1/2}} = \frac{-0.015c^2}{c} = -0.015c$$

$= -1.5\%$ of c

$\therefore \partial c = \pm 1.5\%$ of c