Assignment

Matric No: 17IENG06I047

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1A. $A = \frac{1}{2} b \times h$

$A = \frac{1}{2} ab$

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

$\frac{\partial A}{\partial a} = \frac{1}{2} b \ , \ \frac{\partial A}{\partial b} = \frac{1}{2} a$

$\delta a = \pm \frac{1.5a}{100} \ , \ \delta b = \pm \frac{1.5b}{100}$

$\therefore \delta A = \frac{1b}{2}\left[\frac{\pm 1.5a}{100}\right] + \frac{1}{2} a \left[\frac{1.5b}{100}\right]$

$= \frac{ab}{2}\left(\frac{\pm 1.5 + (\pm 1.5}{100}\right)$

$\delta A = \frac{ab}{2}\left(\pm 3\%\right)$

but $A = \frac{1}{2} ab = \frac{ab}{2}$

$\delta A = A(\pm 3\%)$

$\therefore$ These is a $\pm 3\%$ change in the area when there is a $\pm 1.5\%$ change in "a" and a $\pm 1.5\%$ change in "b" of the triangle

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

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

$$\frac{\delta h}{\delta a} = \frac{a}{(\sqrt{a^2 + b^2})} , \quad \frac{\partial h}{\partial b} = \frac{b}{(\sqrt{a^2 + b^2})}$$

$$\delta a = \frac{\pm 1.5a}{100} , \quad \delta b = \frac{\pm 1.5b}{100}$$

$$\therefore \delta h = \frac{a}{\sqrt{a^2 + b^2}} \left(\frac{\pm 1.5a}{100} \right) + \frac{b}{\sqrt{a^2 + b^2}} \left(\frac{\pm 1.5b}{100} \right)$$

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

by factorization.

$$\delta h = \frac{\pm 1.5}{100} \left(\frac{a^2 + b^2}{\sqrt{a^2 + b^2}} \right)$$

$$\delta h = \frac{\pm 1.5}{100} (\sqrt{a^2 + b^2})$$

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

$$\delta h = \pm 1.5\% (h)$$

$\therefore$ There is a 1.5% change in the hypotenuse when there is a $\pm 1.5\%$ in "a" and a $\pm 1.5\%$ in "b" of the triangle.