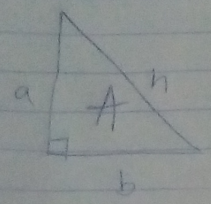
19/10/2018 Jagun Seyi MATHS

17/ENG04/035

Elect/Elect

1) a



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

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

$\therefore \delta A = \frac{b}{2} \cdot \frac{1.5a}{100} + \frac{a}{2} \cdot \frac{1.5}{100} \cdot b$

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

$\pm 1.5\% = (3/2 \pm 100)b$

$= 3b/200$

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

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

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

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

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

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

$\delta h = \frac{dh}{da}\delta a + \frac{dh}{db}\delta b$

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

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

$\delta a = \left(\pm \frac{1.5}{100}\right)\left(\pm \frac{3}{200}\right)$

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

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

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

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

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

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

$\pm \frac{300 \cdot 3}{200}(h)$

$\delta h = 0.05\% \text{ of } h$