**NAME :** OKIEMUTE WATERWAY

**DEPARTMENT**: CIVIL ENGINEERING

**MATRIC NO**: 17/ENG03/056

**COURSE**: ENG281 [ENGINEERING MATHEMATICS}

ASSIGNMENT

The hypotenuse of a right angled triangle is denoted as C, as the other two sides are denoted as **a & b**. If the possible error of measuring each of a and b is ± 1.5%. Find the maximum possible error in calculating;

1. The area of the triangle
2. The length of the hypotenuse

**Solution**

a).

 c

 a

 b

Area of triangle = $\frac{1}{2}ab$

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

Let A = (a, b)

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

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

dA = $\frac{dA}{da}$ \* da + $\frac{dA}{db}$ \* db

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

$\frac{ab}{2}$ $\frac{\pm 1.5 }{100}$ + $\frac{ab}{2}$ $\frac{\pm 1.5 }{100}$

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

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

$\pm $ $\frac{ab}{2}$ (0.015 + 0.015)

$\pm $ 0.003 $\frac{ab}{2}$

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

dA = $\pm $ 0.003A

b). $c^{2}= a^{2}+ b^{2}$

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

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

Let c = ( a, b)

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

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

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

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

dc = $\frac{dC}{da}$ \* da + $\frac{dC}{db}$ \* db

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

$\frac{1}{\sqrt{a^{2}+ b^{2}}}$ \* ( $\frac{\pm 1.5 a^{2}}{100}$) + $\frac{1}{\sqrt{a^{2}+ b^{2}}}$ \* ( $\frac{\pm 1.5 b^{2}}{100}$)

±$\frac{1}{\sqrt{a^{2}+ b^{2}}}$ ( $\frac{\pm 1.5 a^{2}}{100}$ + $\frac{\pm 1.5 b^{2}}{100}$)

±$\frac{1}{\sqrt{a^{2}+ b^{2}}}$ (0.015$a^{2}$ + 0.015$b^{2}$)

±$\frac{1}{\sqrt{a^{2}+ b^{2}}}$ 0.015($a^{2}+b^{2}$)

± $\frac{1}{c}$ \* 0.015$c^{2}$

=± 0.015c