

Trigonometry and Matrices

Function of a complex variable

Show that

$$\log(\log(x+iy)) = \frac{1}{2} \log(p^2 + q^2) + i \frac{\tan^{-1} q}{p}$$

where $p = \frac{1}{2} \log(x^2 + y^2)$ and

$$q = \frac{\tan^{-1} y}{x}$$

Sol.

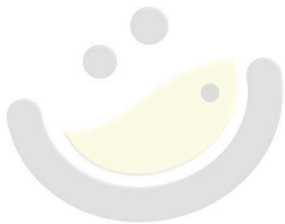
We have

$$\log(x+iy) = \frac{1}{2} \log(x^2 + y^2) + i \tan^{-1} \frac{y}{x}$$

$$\log(x+iy) = p + iq \quad \text{--- (1)}$$

$$\log(\log(x+iy)) = \log(p+iq) \quad \text{[from (1)]}$$

$$= \frac{1}{2} \log(p^2 + q^2) + i \tan^{-1} \frac{q}{p} = \text{R.H.S.}$$



OMG! MATHS!
The poetry of logical ideas.