Answer on question 30692 – Math – Complex Analysis

Express 1-sin A+i cos A in the form of modulus amplitude form.

Solution

Any complex number z=a+bi can also be expressed in the form $r(\cos\theta + i\sin\theta)$.

i.e. $z = a + bi = r(\cos\theta + i\sin\theta)$,

where $r = \sqrt{a^2 + b^2}, \cos\theta = \frac{a}{r}, \sin\theta = \frac{b}{r}$.

The real part of this complex number is a=1-sin A; the imaginary part is b=cos A. Therefrom we get

$$r = \sqrt{(1-\sin A)^2 + \cos^2 A} = \sqrt{2 - 2\sin A}.$$

$$\cos\theta = \frac{1-\sin \mathrm{A}}{\sqrt{2-2\sin A}} = \sqrt{\frac{1-\sin \mathrm{A}}{2}}, \qquad \sin\theta = \frac{\cos A}{\sqrt{2-2\sin A}}.$$

And we obtain the modulus amplitude form

$$z = \sqrt{2-2\sin A}\left(\sqrt{\frac{1-\sin \mathrm{A}}{2}} + i\frac{\cos A}{\sqrt{2-2\sin A}}\right).$$