Answer on Question #58292 – Math – Complex Analysis

Algebraically $|z_1 + z_2|^2$ is the same as ......

Solution:

The absolute value of ta complex number $z = x + iy$ is

$$|z| = \sqrt{x^2 + y^2} \Rightarrow |z|^2 = x^2 + y^2$$

or

$$|z|^2 = z\bar{z}$$

where $\bar{z}$ is complex conjugate of z .

Hence

$$|z_1 + z_2|^2 = (z_1 + z_2)\overline{(z_1 + z_2)} = (z_1 + z_2)(\bar{z_1} + \bar{z_2}) = z_1\bar{z_1} + z_1\bar{z_2} + z_2\bar{z_1} + z_2\bar{z_2}$$

Finally we obtain

$$|z_1 + z_2|^2 = |z_1|^2 + |z_2|^2 + z_1\bar{z_2} + \bar{z_1}z_2$$

Answer: $|z_1 + z_2|^2 = |z_1|^2 + |z_2|^2 + z_1\bar{z_2} + \bar{z_1}z_2,$ where $\bar{z}$ is complex conjugate of z .