Answer on Question #67557 – Math – Complex Analysis

Question

Show that integral

$$\oint \frac{dz}{(z^2-1)^2+3} = \frac{\pi}{2}\sqrt{2},$$

where path of integration is unit circle in the positive sense.

Solution

Let's find zeros of the denominator:

$$(z^2-1)^2+3=0$$

$$(z^2-1)^2=-3$$

$$z^2-1=\pm i\sqrt{3}$$

$$z^2=\left|1\pm i\sqrt{3}\right|$$

$$z=\pm\sqrt{1\pm i\sqrt{3}}$$

4 singular points

The module of each of the singular points is greater than one.

So that neither of them lies inside the unit circle.

Integral of a function over a closed contour, if the domain bounded by the contour does not contain singular points is equal to zero.(The Cauchy theorem)

Hence the value of the integral is zero

Answer: 0.