

Answer on Question #78948 – Math – Complex Analysis

Question

Find the sum of fifth roots of unity.

Solution

By definition, the 5th roots of unity are the solutions of the equation:

$$x^5 = 1. \quad (\text{I})$$

And so they are also the solutions of the equation:

$$x^5 - 1 = 0. \quad (\text{II})$$

However, the sum of the roots of the eqn. (II), as with any monic polynomial, is the opposite of the coefficient of the next-to-leading term. In eqn. (II), the next-to-leading term is the x^4 term. Its coefficient is clearly 0. Therefore, its opposite is clearly 0. Thus, the sum of the solutions of (II) is 0. Hence the sum of the solutions of (I) is 0.

Thus, the sum of the 5th roots of unity is 0.

Answer: the sum of the 5th roots of unity is 0.

Source: Find the sum of the 5th roots of unity. (2018, March 7). Retrieved from <https://socratic.org/questions/find-the-sum-of-the-5th-roots-of-unity-6>