New Equations for Coprimality and Indivisibility

Karakoc, Halil
Ekinci, Mucahit

In this working, we worked on Euler’s totient function and some equations that we found during our working. Our main goal is to find some new mathematical equations to practically solve some specific mathematical problems that is not solvable by Euler’s Totient function. Firstly, we analyzed problems which are solvable by Euler’s totient function. While using these problems, we obtained a new equation about Euler’s totient function which was the first one. Then we obtained our second equation by examining the first equation later third equation by the same manner. In this process, we have obtained various equation including coprimality and indivisibility conditions which are similar to Euler’s totient function. We used Inclusion-Exclusion Principle, Euclidean Algorithm and Euler’s totient function while geting these equations. We have obtained the equations to find the quantity and the sum of, • the K numbers which are less than a given positive integer where any K and any A are coprime integers, • the L numbers which are less than a given positive integer where any L indivisible by any B and every two B numbers are coprime integers, • the G numbers which are less than a given positive integer where any G indivisible by given C numbers whose greatest common divisor of every two C numbers are the same integer, • the D numbers which are also less than a given positive integer where any D divisible by given C numbers whose greatest common divisor of every two C numbers are the same integer. Our research brings a new perspective to Euler’s totient function. The equations we have obtained can be used to generate math problems for Olympiads.

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