

Abstract

In this work we study the k -defect polynomials of a graph G . The k defect polynomial is a function in λ that gives the number of improper colourings of a graph using λ colours. The k -defect polynomials generate the bad colouring polynomial which is equivalent to the Tutte polynomial, hence their importance in a more general graph theoretic setting. By setting up a one-to-one correspondence between triangular numbers and complete graphs, we use number theoretical methods to study certain characteristics of the k -defect polynomials of complete graphs. Specifically we are able to generate an expression for any k -defect polynomial of a complete graph, determine integer intervals for k on which the k -defect polynomials for complete graphs are equal to zero and also determine a formula to calculate the minimum number of k -defect polynomials that are equal to zero for any complete graph.

— Christo Kriel