Title: A formula in the exact equation method and related topics

Abstract

We discuss a formula to solve an exact equation of the form

\[ M(x, y)dx + N(x, y)dy = 0. \]  \hspace{1cm} (1)

Namely, the formula is \( f(x, y) = C \), where \( C \) is arbitrary constant, and

\[ f(x, y) = \int_{x_0}^{x} M(x, y)dx + \int_{y_0}^{y} N(x_0, y)dy. \]

where \((x_0, y_0)\) is any point in the domain of \( M, N \). We will discuss the relation between this formula and the Green-Stoke Theorem, the Fundamental Theorem of Calculus, and especially, how the geometry of the domain of the functions \( M, N \) can have some effect on deriving this formula.

This talk is intended for anyone (including undergraduate students) who is interested in teaching and learning Ordinary Differential Equations and Calculus.