Assignment 1

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1 Unit 1

1.1 Review of first order differential equations

An equation that contains derivatives of one or more unknown functions with respect to one or more independent variables is said to be a differential equation. The order of a differential equation matches the order of the highest derivative that appears in the equation.

1.2 Reduction of order

This method is especially useful for solving second-order homogeneous linear differential equations since (as we will see) it reduces the problem to one of solving relatively simple first- order differential equations.

1.3 Linear Differential Equations

A linear equation or polynomial, with one or more terms, consisting of the derivatives of the dependent variable with respect to one or more independent variables is known as a linear differential equation.

2 Unit 2

2.1 Laplace Transform

Laplace transform is the integral transform of the given derivative function with real variable t to convert into a complex function with variable s. let f(t) be given and assume the function satisfies certain conditions to be stated later on.

2.2 Properties

The Laplace transform can also be used to solve differential equations and is used extensively in mechanical engineering and electrical engineering. The Laplace transform reduces a linear differential equation to an algebraic equation, which can then be solved by the formal rules of algebra.

2.3 Unit step function

The Heaviside step function, or the unit step function, usually denoted by H or 0, is a step function, named after Oliver Heaviside, the value of which is zero for negative arguments and one for positive arguments.

3 Unit 3

3.1 Functions of several variables

A function of variables, also called a function of several variables, with domain is a relation that assigns to every ordered -tuple in a unique real number in . We denote this by each of the following types of notation. The range of is the set of all outputs of . It is a subset of , not .

3.2 Level curves and level surfaces

A level set of a function of two variables f(x,y) is a curve in the two-dimensional xy-plane, called a level curve. A level set of a function of three variables f(x,y,z) is a surface in three-dimensional space, called a level surface.

3.3 Partial and directional derivatives