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3 PARTIAL DIFFERENTIAL EQUATION:

DEFINATION :-

It is a mathematical equation that involves two or more independent variables, an unknown functions (dependent on those variables) and partial derivatives of the unknown function with respect to unknown variables.

EXPLANATION:-

The order of a partial different equation is the order of the highest derivatives involved. A solution (or a particular solution) to a partial differential is a function that solves the equation or, in other words, turns it into an identity when substituted into the equation. A solution is called general if it contains all particular solutions of the equation concerned.

The term exact solution

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is often used for second and higher order nonlinear PDEs to denote a particular solution. Particular equation are used to mathematically to formulate and thus aid the solution of physical and other problems involving functions of several variables, such as propagation of heat or sound, fluid flow, elasticity, electrostatics, electrodynamics etc.

TYPES OF PDE's

- First order Partial Differential equation.
- linear partial Differential equation.
- Quasi linear partial Differential equation.
- Homogeneous partial Differential equation

APPLICATIONS OF PDE:-

The heat equation is an important partial differential equation which describes the distribution of heat (or variation in temperature) in a given

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region over time. The equation in one spatial dimension can be stated as follow..

$$\frac{\partial u}{\partial t} = k\frac{\partial^2 u}{\partial x^2}$$

Where $u(x,t)$ deserbes the temperature at a given location x and time t. and k is the thermal diffusivity.

The temperature at any location and time, $u(x,t)$ satisfy (1) with the boundary condetion. $u(0,t)$ and $u(1,t) = 0$.

Verify that

$$u(x,t) = \sum_{n=1}^{\infty} \frac{40}{n\pi}(1-(-1)^n)e^{-kn^2\pi^2 t}\sin(n\pi x)$$

is a solution to the heat equation $\frac{\partial u}{\partial t} = k\frac{\partial^2 u}{\partial x^2}$, with the following. prescribed boundary conditions

$u(0,t)=0$ Prescribed temperature of $0°C$ at $x=0$.

$u(1,t)=0$ Prescribed temperature of $0°C$ at $x=1$

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The applications of integral equations are not restricted to ordinary differential equations. In facts the most important application of integral equation arises in the finding the solutions of the boundary value problems in the theory of partial differential equation of the second order. The boundary value problems for equation of elliptic type can be reduced to Fredholm integral equations, where as the study of parabolic and hyperbolic differential equations leads to volterra integral equation