



# Beginning Partial Differential Equations

By O'Neil, Peter V.

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 Summary: 1. First Order Equations. Notation and Terminology. The Linear First Order Equation. The Significance of Characteristics. The Quasi-Linear Equation. 2. Linear Second Order Equations. Classification. The Hyperbolic Canonical Form. The Parabolic Canonical Form. The Elliptic Canonical Form. Some Equations of Mathematical Physics. The Second Order Cauchy Problem. Characteristics and the Cauchy Problem. Characteristics As Carriers of Discontinuities. 3. Elements of Fourier Analysis. Why Fourier Series? The Fourier Series of a Function. Convergence of Fourier Series. Sine and Cosine Expansions. The Fourier Integral. The Fourier Transform. Convolution. Fourier Sine and Cosine Transforms. 4. The Wave Equation. The Cauchy Problem and d'Alembert's Solution. d'Alembert's Solution As a Sum of Waves. The Characteristic Triangle. The Wave Equation on a Half-Line. A Problem on a Half-Line With Moving End. A Nonhomogeneous Problem on the Real Line. A General Problem on a Closed Interval. Fourier Series Solutions on a Closed Interval. A Nonhomogeneous Problem on a Closed Interval. The Cauchy Problem by Fourier Integral. A Wave Equation in Two Space Dimensions. The Kirchhoff/Poisson Solution. Hadamard's Method of Descent. 5. The Heat Equation. The Cauchy Problem and Initial Conditions. The...



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