ME 303 Advanced Engineering Mathematics

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Ordinary Differential Equations in Cartesian Coordinates

When certain partial differential equations formulated in Cartesian coordinates are separated by the separation of variables method, or the Laplace transform method, or the similarity method, one of the following second-order differential equations may appear.

As a review of some second-order ordinary differential equations, obtain the solutions of the following *ODES* using any **CAS** such as: *Mathematica, Maple, Matlab, MathCAD*, etc.

$$\frac{d^2y}{dx^2} = 0 \tag{1}$$

$$\frac{d^2y}{dx^2} = \frac{S}{k} \tag{2}$$

$$\frac{d^2y}{dx^2} = -\frac{S}{k} \tag{3}$$

$$\frac{d^2y}{dx^2} + \lambda^2 y = 0 \tag{4}$$

$$\frac{d^2y}{dx^2} - \lambda^2 y = 0 \tag{5}$$

$$\frac{d^2y}{d\eta^2} + 2\eta\frac{dy}{d\eta} = 0 \tag{6}$$