Substitutions and Transformations:

(a) Identify the type of equation and determine the appropriate substitution or tranformation.

(b) Rewrite the original equation in terms of new variables.

(c) Solve the transformed equation.

(d) Express the solution in terms of the original variables.

Definition of Homogeneous Equation:

If the right-hand side of the equation

$$\frac{dy}{dx} = f(x, y)$$

can be expressed as a function of the ration $\frac{y}{x}$ alone, then we say the equation is **homogeneous**.

Definition of Bernoulli Equation

A first-order equation that can be written in the form

$$\frac{dy}{dx} + P(x)y = Q(x)y^n$$

where $P(x)$ and $Q(x)$ are continuous on an interval (a, b) and n is a real number, is called a **Bernoulli equation**.