

## Method of Solution for Linear Equations

1. Start with equation standard form:

$$\frac{dy}{dx} + p(x)y = q(x)$$

2. Find the Integrating Factor (I.F.)

$$\mu(x) = e^{\int p(x) dx}$$

3. Multiply through the equation by the I.F.

$$\mu(x)\frac{dy}{dx} + \mu(x)p(x)y = \mu(x)q(x)$$

4. Write the left side as an exact differential

$$\frac{d}{dx} [\mu(x)y] = \mu(x)q(x)$$

5. Integrate both sides with respect to  $x$

$$\mu(x)y = \int \mu(x)q(x) dx + C$$

6. Solve for  $y$