# Integrating Factor – Questions

1. Solve $\frac{dy}{dx} + \frac{2y}{x} = 0$ using an integrating factor
2. Solve $\frac{dy}{dx} + 3y = e^x$
3. Solve $\frac{dy}{dx} + 2xy = e^{x-x^2}$
4. Solve $\frac{dy}{dx} + \frac{y}{x} = 3x - \frac{2}{x}$
5. Solve $\frac{dy}{dx} - \frac{3y}{x+1} = (x+1)^4$

# Integrating Factor – Answers

1. $y = \frac{c}{x^2}$
2. $y = \frac{c}{e^{3x}} + \frac{1}{4}e^{x}$
3. $y = ce^{-x^2} + e^{x-x^2}$
4. $y = \frac{c}{x} + x^2 - 2$
5. $y = c(x+1)^3 + x(x+1)^3$

# Integrating Factor – Theory

$$y' + y\,p(x) = q(x)$$

$$I.F. = e^{\int p(x)dx}$$

$$(y' + y\,p(x))e^{\int p(x)dx} = q(x)e^{\int p(x)dx}$$

$$\left(ye^{\int p(x)dx}\right)' = q(x)e^{\int p(x)dx}$$