

ODE

Second Order ODE

Non-Homogeneous

1. $y'' - y' - 2y = -2t + 4t^2$

2. $y'' - 4y' + 3y = 2\cos(x) + 4\sin(x)$

3. $y'' - 2y' + y = 2\sin(t)$

4. $y'' + 3y = 30e^{2t}$

5. $y'' - 18y' + 141y = 9e^{3t}$

6. $y'' - y' = -\cos(x)$

7. $y'' + 3y' + 2y = t^2$

8. $y'' + 3y' + 5y = 2e^{-3x}$

9. $y'' + y' - 2y = 36e^{2t}$

10. $\frac{1}{4}y'' + y' + y = x^2 - 2x$

Answers

ODE

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Non-Homogeneous

$$1. y = c_1 e^{2t} + c_2 e^{-t} - 2t^2 + 3t - \frac{7}{2}$$

$$2. y = c_1 e^{3x} + c_2 e^x + \cos(x)$$

$$3. y = c_1 e^t + c_2 t e^t + \cos(t)$$

$$4. y = c_1 \cos(\sqrt{3}t) + c_2 \sin(\sqrt{3}t) + \frac{30}{7} e^{2t}$$

$$5. y = e^{9t} \left(c_1 \cos(2\sqrt{15}t) + c_2 \sin(2\sqrt{15}t) \right) + \frac{3}{32} e^{3t}$$

$$6. y = c_1 e^x + c_2 + \frac{1}{2} \sin(x) + \frac{1}{2} \cos(x)$$

$$7. y = c_1 e^{-t} + c_2 e^{-2t} + \frac{t^2}{2} - \frac{3t}{2} + \frac{7}{4}$$

$$8. y = e^{-\frac{3x}{2}} \left(c_1 \cos\left(\frac{\sqrt{11}x}{2}\right) + c_2 \sin\left(\frac{\sqrt{11}x}{2}\right) \right) + \frac{2}{5} e^{-3x}$$

$$9. y = c_1 e^t + c_2 e^{-2t} + 9e^{2t}$$

$$10. y = c_1 e^{-2x} + c_2 x e^{-2x} + x^2 - 4x + \frac{7}{2}$$