

ODE

Second Order ODE

Real Roots

1. $y'' - y' - y = 0$

2. $\frac{d^2x}{dt^2} - 64x = 0$

3. $2y'' + y' = y$

4. $y'' - y' - 2y = 0$

5. $3y'' - 10y' + 2y = 0$

6. $y'' - 4y = 0$

7. $2y'' + 3y' - 2y = 0$

8. $y'' + 7y' - 30y = 0$

9. $\frac{d^2}{dx^2}y + 3\frac{d}{dx}y + 2y = 0$

10. $y'' + y' = y$

Answers

ODE

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Real Roots

$$1. y = c_1 e^{\frac{(1 + \sqrt{5})t}{2}} + c_2 e^{\frac{(1 - \sqrt{5})t}{2}}$$

$$2. x = c_1 e^{8t} + c_2 e^{-8t}$$

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

$$4. y = c_1 e^{2t} + c_2 e^{-t}$$

$$5. y = c_1 e^{\frac{(5 + \sqrt{19})t}{3}} + c_2 e^{\frac{(5 - \sqrt{19})t}{3}}$$

$$6. y = c_1 e^{2t} + c_2 e^{-2t}$$

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

$$8. y = c_1 e^{3t} + c_2 e^{-10t}$$

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

$$10. y = c_1 e^{\frac{(-1 + \sqrt{5})t}{2}} + c_2 e^{\frac{(-1 - \sqrt{5})t}{2}}$$