

QUIZ 11: SOLUTIONS

$$\text{LET } y'' - 2y' - 2y = 0$$

① FIND THE GENERAL SOLUTION

CHARACTERISTIC EQ'N IS $r^2 - 2r - 2 = 0$

$$\text{SO } r = \frac{2 \pm \sqrt{4 + 8}}{2} = 1 \pm \sqrt{3}.$$

GENERAL SOLUTION IS

$$y(t) = A e^{(1+\sqrt{3})t} + B e^{(1-\sqrt{3})t}$$

② FIND SOLUTION WITH $y(0) = 0$, $y'(0) = 4\sqrt{3}$

SINCE $y(0) = 0$, $A + B = 0$, i.e. $A = -B$

$$y'(t) = A(1+\sqrt{3})e^{(1+\sqrt{3})t} + B(1-\sqrt{3})e^{(1-\sqrt{3})t}$$

$$\text{SO } (1+\sqrt{3})A + (1-\sqrt{3})B = 4\sqrt{3}$$

$$\text{i.e. } (1+\sqrt{3})A - (1-\sqrt{3})A = 4\sqrt{3}$$

$$2\sqrt{3}A = 4\sqrt{3}$$

$$\Rightarrow A = 2.$$

$$\therefore y(t) = 2e^{(1+\sqrt{3})t} - 2e^{(1-\sqrt{3})t}$$