Tutorial: 3

1 Given the function e^x and e^{-x} on any interval $[a,b]$. Are these functions linearly independent?

2 Verify that $x^{-\frac{1}{2}}$ and $x^{\frac{3}{2}}$ form a basis of solution of $4x^2 y'' - 3y = 0$.

3 Find an ODE for which the given functions form a basis of solutions e^x and xe^x.

4 Find the solution of differential equation $y'' - 5y' + 6y = 0$ with initial conditions $y(1) = e^2$ and

$y'(1) = 3e^2$.

5 Solve the initial value problem $y'' + y' - 2y = 0$, $y(0) = 4$ and $y'(0) = -5$

6 Find the general solution of $\dfrac{d^4 y}{dx^4} - 18\dfrac{d^2 y}{dx^2} + 81y = 0$

7 Solve $y'' + 4y' + 4y = 0$, $y(0) = 1$ and $y'(0) = 1$

8 Solve $y'' + 2y' + 2y = 0$, $y(0) = 1$ and $y\left(\dfrac{\pi}{2}\right) = 0$

9 Find the general solution of $(D^2 + 1)y = 0$

10 Determine a second solution of $x^2 \dfrac{d^2 y}{dx^2} - 2y = 0$, $x > 0$ where $y_1 = \dfrac{1}{x}$

11 Using method of undetermined coefficient, find the general solution of the differential equation $y'' + 2y' + 10y = 25x^2 + 3$

12 Using method of undetermined coefficient, find the general solution of the differential equation $y'' + 4y = 2\sin 3x$.

13 Apply the method of variation of parameters to solve $y'' + 9y = \sec 3x$

14 Apply the method of variation of parameters to solve $y''' + y' = \cos ecx$.

15 Apply the method of variation of parameters to solve $y'' - 6y' + 9y = \dfrac{e^{3x}}{x^2}$.