

■ **ME 501 Analytical Methods in Engineering Homework 3-a**  
**Given 22.10.2014 Due to : 05.11.2014**

■ **1- Solve DEs.**

- a -  $6y'' - 5y' + y = 0$ , where  $y(0) = 4$ ,  $y'(0) = 0$   
b -  $x^2 y'' + 9xy' - 9y = 0$ , where  $y(1) = 1$ ,  $y'(1) = 0$   
c -  $y'' + 2y' + 2y = 0$ , where  $y(\pi/4) = 2$ ,  $y'(\pi/4) = -2$

■ **2 - Solve DEs by Reduction of Order.**

- a -  $x^2 y'' - 4xy' + 6y = 0$ , where  $x > 0$ ,  $y_1(x) = x^2$   
b -  $xy'' - 4y' + 4x^3 y = 0$ , where  $x > 0$ ,  $y_1(x) = \sin(x^2)$

■ **3 - Solve DEs**

- a -  $y'' + 2y' + 5y = 3 \sin(2x)$   
b -  $y'' + y' + 4y = 2 \sinh(x)$ , note :  $\sinh(x) = (e^x - e^{-x}) / 2$

■ **4 - Solve DE using Variation of Parameters**

- a -  $4y'' + y' = 2 \sec(x/2)$   
b -  $y'' + 4y' + 4y = x^{-2} e^{-2x}$   $x > 0$   
c -  $x^2 y'' - 3xy' + 4y = x^2 \ln x$   $x > 0$

■ **5 - Solve DE using Power Series**

- a -  $y'' + xy' + y = 0$ , where  $y(0) = 1$ ,  $y'(0) = 0$   
a -  $y'' + 4y' + 6xy = 0$