King Fahd University of Petroleum and Minerals
Department of Mathematics and Statistics

Math 202 **Section .....** **Serial #: ....** **Quiz 5(a) (Term 172)**

Name : ..... **ID** #..... **Marks** #: ...../8

1. Find regular and irregular singular points of the differential equation

$$2x(x-2)^2\,y'' + 3xy' + (x-2)\,y = 0.$$

2. Solve the nonhomogeneous system

$$X' = \begin{bmatrix} 1 & 3 \\ 1 & -1 \end{bmatrix} X + \begin{pmatrix} 0 \\ t \end{pmatrix}$$

by the variation of parameters method.

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1. For the system $X' = \begin{bmatrix} 1 & -1 \\ 1 & -1 \end{bmatrix} X + \begin{bmatrix} \frac{1}{t} \\ \frac{1}{t} \end{bmatrix}$, $X_C = c_1 \begin{bmatrix} 1 \\ 1 \end{bmatrix} + c_2 \begin{bmatrix} t+1 \\ t \end{bmatrix}$. Find X_p.

2. Find two Frobenius solutions about regular singular point $x = 0$ for $2xy'' - (3 + 2x)\, y' + y = 0$.

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Math 202 **Section .....** **Serial #: ....** **Quiz 5(c) (Term 172)**

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1. For the system $X' = \begin{bmatrix} 2 & 0 \\ 0 & -3 \end{bmatrix} X + \begin{bmatrix} t \\ e^{-t} \end{bmatrix}$, fundamental matrix is $\phi(t) = \begin{bmatrix} e^{2t} & 0 \\ 0 & e^{-3t} \end{bmatrix}$. Find X_p.

2. Find series solution of $4xy'' + 2y' + y = 0$ about regular singular point $x = 0$ corresponding to the larger indicial root.