

MATH2214 - Review For Test No1- Fall 03- Konaté

Notice: Show your work. A right answer with a bad reasoning will be considered as wrong. Class abstracts are allowed. No calculator allowed.

Problem 1•

Find the largest interval of existence of its solution and solve the differential equation

$$\begin{cases} (t^2 - 1)\frac{dy}{dt} + ty = 1 \\ y(0) = 2 \end{cases}$$

Problem 2•

Determine the constant k such that $y(t)$ is a solution of the differential equation

$$\begin{cases} ty' + 3y = 2t^5 \\ y(2) = 1 \end{cases} \quad \text{and} \quad y(t) = \frac{1}{4}t^5 + kt^{-3}$$

Problem 3•

a• Show that $y_1(t) = e^{-2t}$ and $y_2(t) = e^{3t}$ are linearly independent on the real line and the Wronskian $W(y_1, y_2)(t)$ is not nul at any point t of the real line.

b• Solve
$$\begin{cases} y'' - y = 0 \\ y(0) = 0 \\ y'(0) = 2 \end{cases}$$

c• Solve
$$\begin{cases} y'' - 4y' + 4y = 0 \\ y(0) = 1 \\ y'(0) = 1 \end{cases}$$

d• Solve
$$\begin{cases} y'' - 2y' + 2y = 0 \\ y(0) = 0 \\ y'(0) = 5 \end{cases}$$

Problem 4•

Determine the constant coefficients a and b such that $y_1(t) = e^{-2t}$ and $y_2(t) = e^{3t}$ are two fundamental solutions of $y'' + ay' + by = 0$
