Differential Equations/ Linear Algebra
Mid term Test -II

MTH 2201 3/29/2005

Duration: 1 hour Max. Credit: 30 points

Answer all the questions. No credit will be given if only the answer is written without showing the relevant supporting work. Write legibly. The numbers at the end of each question indicate the maximum credit for the corresponding question.

1. Find the general solution of \( y'' - y' - 2y = e^{-t} \) using the method of variation of parameters. \([6]\)

2. Find the general solution of \( y'' - 2y' + y = te^t + 4 \) by the method of undetermined coefficients. \([6]\)

3. Find the Laplace Transform of \( f(t) = t \int_0^t \sin \tau \, d\tau \). \([3]\)

4. Solve the DE \( y'' + 9y = u(t - \pi) \cos 3t \), by the Laplace transform method, using the initial values \( y(0) = 0 \), \( y'(0) = 0 \). \([6]\)

5. Find \( A^{-1} = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 1 & 3 \\ 0 & 0 & 1 \end{bmatrix} \) by Gauss-Jordan Elimination on \([A \; I]\). \([3]\)

6. Consider the system of equations:

\[
\begin{align*}
2x - 3y &= 3 \\
4x - 5y + z &= 7 \\
2x - y - 3z &= 5.
\end{align*}
\]

(i) Interpret these equations as linear combinations of vectors. \([2]\)
(ii) Solve the system by Gauss Elimination Method. \([4]\)