

Ask! Indicate your approach! Show your work! Good Luck! There are 8 problems, 5 pages, and 105 points.

(1) [15] Find the determinant of $\begin{vmatrix} 3 & 5 & -1 & 2 \\ 2 & 1 & 2 & 5 \\ 3 & -1 & 7 & 5 \\ 1 & -1 & 2 & 1 \end{vmatrix}$.

(2) [15] Solve the IVP $y'' + y' + 2y = \cos t$, $y(0) = 0$, $y'(0) = -1$.

(3) [10] Find AB and BA , given that $A = \begin{pmatrix} 1 & 2 & 1 \\ 1 & 3 & 3 \\ 1 & 4 & 6 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 3 \end{pmatrix}$. Is it true that $AB = BA$?

(4) [15] Find A^2 , A^3 and A^4 , given that $A = \begin{pmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{pmatrix}$. Hint: Think of $A=I+T$; then I and T commute.

Compute T^2 and T^3 "on the side."

Scratch Page Be sure to **CLEARLY** link work here to a problem! Put the link **THERE** too!

(5) [10] Solve the system $x + 2y - 3z = 1$, $-2x + 4y - 5z = 2$, $-z + 3x - 7y = 3$.

(6) [15] Reduce the matrix $\begin{pmatrix} 2 & 1 & -1 & 3 \\ 1 & -1 & 2 & 1 \\ 3 & 0 & 1 & 3 \\ 1 & -2 & 3 & -2 \end{pmatrix}$ to RREF. What is the rank of the matrix?

(7) [15] Find the inverse of $\begin{pmatrix} 1 & 1 & -1 \\ -1 & 1 & -1 \\ -1 & 1 & 1 \end{pmatrix}$.

(8) [10] Show that the functions $1, x, x^2, x^3, x^4$ are linearly independent on the interval $[-1, 1]$.