MATH-9 Sample Test 1 (Chapter 9)

100 points NAME:_____

Be sure to show all work neatly and follow instructions carefully; *no credit given if requested method is not used*. Clearly mark all answers. Express answers as ordered pairs/triples where appropriate. NO GRAPHING CALCULATORS, SCRATCH PAPER, BOOKS, NOTES, ELECTRONIC DICTIONARIES ETC.

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(1) Given the following matrices:

$$A=\begin{bmatrix}3 & 1\\ 7 & -2\end{bmatrix} B=\begin{bmatrix}3 & 1 & 2\\ -1 & 1 & 5\\ -4 & -3 & 3\end{bmatrix} C=\begin{bmatrix}4 & -6\\ 2 & 5\end{bmatrix} D=\begin{bmatrix}-5 & 0 & -2\\ 3 & 1 & -7\end{bmatrix} E=\begin{bmatrix}-1 & -2 & 0 & 4\\ 4 & 2 & 3 & 0\\ 7 & -1 & -1 & 1\\ 6 & 0 & 0 & 0\end{bmatrix}$$

Find the following, if possible. (If not possible, say so.)

(a) DA (b) A + C

(c) A C (d) DB

(g) det (B) (h) det (E)

(2) Use Cramer's Rule to solve the following system. $\begin{cases}3x-3y=5\\ -x+5y=7\end{cases}$

(3) Find the inverse of the matrix A.

$$A=\begin{bmatrix}1 & -2 & -4\\ 2 & -3 & -6\\ -3 & 6 & 15\end{bmatrix}$$

Use A^{-1} to solve the system $\begin{cases}x-2y-4z=2\\ 2x-3y-6z=0\\ -3x+6y+15z=1\end{cases}$

(4) Solve: $\begin{cases}x^2+2y^2-7y=0\\ x^2+y^2=10\end{cases}$

(5) Solve using any of the methods discussed in class.

$$\begin{aligned}x+y-10z&=-4\\ -3x-5y+36z&=10\\ -x+7z&=5\end{aligned}$$

(6) Find the partial fraction decomposition of $\dfrac{2x-4}{x(x-1)^2}$

(7) Use matrix methods (Gaussian elimination or Gauss Jordan) to solve:

$$\begin{aligned}3x+2y-5z&=1\\ 2x-3y-8z&=1\\ x+5y+2z&=1\end{aligned}$$

You must obtain row echelon form or reduced row echelon form. Be sure to label operations performed at each step.

Answers:

(1) (a) not possible (b) $\begin{bmatrix} 7 & -5 \\ 9 & 4 \end{bmatrix}$ (c) $\begin{bmatrix} 14 & -13 \\ 24 & -52 \end{bmatrix}$ (d) $\begin{bmatrix} -7 & 1 & -16 \\ 36 & 25 & -10 \end{bmatrix}$

(g) 51 (h) $-6\begin{vmatrix} -2 & 0 & 4 \\ 2 & 3 & 0 \\ -1 & -1 & 1 \end{vmatrix}=12$

(2) D=12, Dx=46, Dy=26 => $\left(\frac{23}{6},\frac{13}{6}\right)$

(3) $A^{-1}=\begin{bmatrix} -3 & 2 & 0 \\ -4 & 1 & -\frac{2}{3} \\ 1 & 0 & \frac{1}{3} \end{bmatrix}$, $\vec{x}=A^{-1}\vec{b}=\begin{bmatrix} -6 \\ -26/3 \\ 7/3 \end{bmatrix}$ so solution is $\left(-6,-\frac{26}{3},\frac{7}{3}\right)$

(4) $\left(\pm\sqrt{6},2\right)$ (5) Dependent, answer not unique..(7t-5, 3t+1, t)

(6) $\frac{-4}{x}+\frac{4}{x-1}-\frac{2}{(x-1)^2}$ (7) (-2, 1, -1)