Pre-Calculus Homework #17

1) Find both the determinant and inverse of both $A = \begin{bmatrix} -6 & 4 \\ -8 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & -7 \\ -2 & -5 \end{bmatrix}$

2) Find, if it exists, the inverse of A, or A^{-1}, if $A = \begin{bmatrix} -5 & 4 & -2 \\ 7 & -3 & -6 \\ 8 & 9 & -1 \end{bmatrix}$ and check your

answers by finding $A^{-1}A$ and AA^{-1}

3) Find the determinant of A, or $|A|$, if $A = \begin{bmatrix} -\dfrac{3}{5} & \dfrac{2}{3} & \dfrac{-4}{3} \\ \dfrac{1}{2} & \dfrac{2}{5} & \dfrac{-3}{2} \\ \dfrac{-1}{4} & \dfrac{-1}{5} & \dfrac{7}{6} \end{bmatrix}$

4) If possible, find $9A - 7B$, $-5A$, AB, and BA if

$$A = \begin{bmatrix} -9 & 0 & 6 & -5 & 2 \\ 3 & -8 & -1 & -6 & 4 \\ 0 & 7 & -4 & -3 & 8 \end{bmatrix} \text{ and } B = \begin{bmatrix} 6 & -7 & 5 \\ 2 & 4 & 0 \\ -9 & 1 & -8 \\ 3 & -6 & -3 \end{bmatrix}$$

5) Find, if it exists, the inverse of A, or A^{-1}, if $A = \begin{bmatrix} 1 & -4 & 8 \\ 1 & -3 & 2 \\ 2 & -7 & 10 \end{bmatrix}$ and check your answers

by finding $A^{-1}A$ and AA^{-1}

6) Solve the following system of equations using matrices and Cramer's rule:

$$5x - 4y = -3$$
$$7x + 2y = 6$$

7) Decompose $\dfrac{-3x + 28}{(3x - 2)(2x + 3)}$ into partial fractions.

8) Solve the following system of equations using matrices and the inverse:

$$2x - 3y = 7$$
$$4x + y = -7$$

9) Decompose $\dfrac{13x + 46}{12x^2 - 11x - 15}$ into partial fractions.

10) Solve the following system of equations using matrices and Cramer's rule:

$$3x + 2y - z = 4$$
$$3x - 2y + z = 5$$
$$4x - 5y - z = -1$$

11) Decompose $\dfrac{x^2 - x - 4}{(x-2)^3}$ into partial fractions.

12) Solve the following system of equations using matrices and the inverse:

$$x + 2y + 3z = -1$$
$$2x - 3y + 4z = 2$$
$$-3x + 5y - 6z = 4$$

13) Decompose $\dfrac{x^2 - 10x + 13}{(x^2 - 5x + 6)(x - 1)}$ into partial fractions.

14) Solve the following problem using matrices and Cramer's rule. Rebecca likes to shop but she never has enough money to buy all of the clothes that she likes. So, when she received her $1,962 tax refund check in the mail, she decided to go on a shopping spree. On Monday, she went to the store and bought four skirts, two dresses, and three blouses for a total of $481. On Tuesday, she went back out and bought three skirts, three dresses, and two blouses for a total of $528. On Wednesday, she concluded her three day shopping spree by buying five skirts, four dresses, and four blouses for a total of $791. On Thursday, she couldn't stop thinking about the one dress and one blouse that she really liked but didn't buy. Assuming that all of the skirts were the same price, all of the dress were equally priced, and that all of the blouses cost the same price, how much does each one cost and does Rebecca have enough money left over to buy one more dress and one more blouse? If not, how much more money would she need?

15) Decompose $\dfrac{10x^3 - 15x^2 - 35x}{x^2 - x - 6}$ into partial fractions.

16) Solve the following system of equations using matrices and the inverse:

$$5w - 4x + 3y - 2z = -6$$
$$w + 4x - 2y + 3z = -5$$
$$2w - 3x + 6y - 9z = 14$$
$$3w - 5x + 2y - 4z = -3$$

17) Decompose $\dfrac{26x^2 + 208x}{(x^2 + 1)(x + 5)}$ into partial fractions.

18) Solve the following problem using matrices and Cramer's rule. On Saturday night, the gross receipts for a movie theater were $2,599 based on the sale of 280 total tickets. The amount of adult tickets sold that night were eighty-three less than twice the sum of the children's and senior citizen's tickets sold. If the cost of an adult's ticket is $12, the cost of a children's ticket is $5, and the cost of a senior citizen's ticket is $7, how many adult, child, and senior citizen tickets were sold?

19) Decompose $\dfrac{11x^2 - 39x + 16}{(x^2 + 4)(x - 8)}$ into partial fractions.

20) Solve the following problem using matrices and the inverse. A landscaping business uses mulch, topsoil, gravel, and sand for various projects. Last week, they purchased a total of ten tons of mulch, topsoil, gravel, and sand. Twice the combined weight of the topsoil and gravel is the same as triple the combined weight of the mulch and sand. Four times the weight of topsoil minus the weight of the sand is equal to triple the combined weight of the mulch and gravel. The total cost of buying all of the mulch, topsoil, gravel, and sand was $264. If the cost of mulch is $32 per ton, the cost of topsoil is $27 per ton, the cost of gravel is $18 per ton, and the cost of sand is $24 per ton, how many tons of each product did the landscaping business purchase?