College Algebra

Name Key

Chapter 7 Partial Fractions Day 2

Date: ____________ Period: ______

Find the partial fraction decomposition.

1.) $\dfrac{x+7}{x^2-x-6}$ $\quad \dfrac{A}{X-3} + \dfrac{B}{X+2}$

$(X-3)(X+2)$

$X+7 = A(X+2) + B(X-3)$

$1X+7 = AX+2A+BX-3B$

$A+B=1$

$2A-3B=7$

$$\begin{bmatrix} 1 & 1 \\ 2 & -3 \end{bmatrix}\begin{bmatrix} A \\ B \end{bmatrix} = \begin{bmatrix} 1 \\ 7 \end{bmatrix}$$

$-3-2$

-5

$$-\frac{1}{5}\begin{bmatrix} -3 & -1 \\ -2 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 3/5 & 1/5 \\ 2/5 & -1/5 \end{bmatrix}\cdot\begin{bmatrix} 1 \\ 7 \end{bmatrix} = \begin{bmatrix} A \\ B \end{bmatrix}$$

$\frac{3}{5}+\frac{7}{5}$

$2/5 - 7/5$

$$\begin{bmatrix} 2 \\ -1 \end{bmatrix} = \begin{bmatrix} A \\ B \end{bmatrix}$$

$A=2 \quad B=-1$

$$\boxed{\frac{2}{X-3} - \frac{1}{X+2}}$$

or

$$\boxed{\frac{-1}{X+2} + \frac{2}{X-3}}$$

2.) $\dfrac{9x-7}{2x^2-3x+1}$ $\quad \dfrac{A}{2X-1} + \dfrac{B}{X-1}$

$(2X-1)(X-1)$

$9X-7 = A(X-1) + B(2X-1)$

$9X-7 = AX - A + 2BX - B$

$A+2B=9$

$-A-B=-7$

$$\begin{bmatrix} 1 & 2 \\ -1 & -1 \end{bmatrix}\begin{bmatrix} A \\ B \end{bmatrix} = \begin{bmatrix} 9 \\ -7 \end{bmatrix}$$

$-1 - -2$

1

$$\frac{1}{1}\begin{bmatrix} -1 & -2 \\ 1 & 1 \end{bmatrix}$$

$$\begin{bmatrix} -1 & -2 \\ 1 & 1 \end{bmatrix}\circ\begin{bmatrix} 9 \\ -7 \end{bmatrix} = \begin{bmatrix} A \\ B \end{bmatrix}$$

$-9 \quad 14$

$9 \quad -7$

$$\begin{bmatrix} 5 \\ 2 \end{bmatrix} = \begin{bmatrix} A \\ B \end{bmatrix}$$

$A=5 \quad B=2$

$$\boxed{\frac{5}{2X-1} + \frac{2}{X-1}}$$

3.) $\dfrac{7x-26}{x^2-6x-16}$ $\dfrac{A}{X-8}+\dfrac{B}{x+2}$

$(X-8)(X+2)$

$7X-26=A(X+2)+B(X-8)$

$7X-26 \quad AX+2A+BX-8B$

$A+B=7$

$2A-8B=-26$

$\begin{bmatrix}1 & 1\\ 2 & -8\end{bmatrix}\begin{bmatrix}A\\ B\end{bmatrix}=\begin{bmatrix}7\\ -26\end{bmatrix}$

$-8-2$
-10

$-\frac{1}{10}\begin{bmatrix}-8 & -1\\ -2 & 1\end{bmatrix}$

$\begin{bmatrix}4/5 & 1/10\\ 1/5 & -1/10\end{bmatrix}\begin{bmatrix}7\\ -26\end{bmatrix}=\begin{bmatrix}A\\ B\end{bmatrix}$

$\frac{28}{5} \quad -\frac{13}{5}$

$\frac{7}{5} \quad \frac{13}{5}$

$\begin{bmatrix}3\\ 4\end{bmatrix}=\begin{bmatrix}A\\ B\end{bmatrix}$

$A=3 \qquad B=4$

$\boxed{\dfrac{3}{X-8}+\dfrac{4}{X+2}}$

4.) $\dfrac{-3x-23}{x^2-x-12}$ $\dfrac{A}{X-4}+\dfrac{B}{X+3}$

$(X-4)(X+3)$

$-3X-23=A(X+3)+B(X-4)$

$-3X-23=AX+3A+BX-4B$

$A+B=-3$

$3A-4B=-23$

$\begin{bmatrix}1 & 1\\ 3 & -4\end{bmatrix}\begin{bmatrix}A\\ B\end{bmatrix}=\begin{bmatrix}-3\\ -23\end{bmatrix}$

$-4-3$
-7

$-\frac{1}{7}\begin{bmatrix}-4 & -1\\ -3 & 1\end{bmatrix}$

$\begin{bmatrix}4/7 & 1/7\\ 3/7 & -1/7\end{bmatrix}\begin{bmatrix}-3\\ -23\end{bmatrix}=\begin{bmatrix}A\\ B\end{bmatrix}$

$-\frac{12}{7} \quad -\frac{23}{7}$

$-\frac{9}{7} \quad \frac{23}{7}$

$\begin{bmatrix}-5\\ 2\end{bmatrix}=\begin{bmatrix}A\\ B\end{bmatrix}$

$A=-5 \qquad B=2$

$\boxed{\dfrac{-5}{X-4}+\dfrac{2}{X+3}}$

or

$\boxed{\dfrac{2}{X+3}-\dfrac{5}{X-4}}$

Find the inverse.

5.) $\begin{bmatrix} 2 & -6 \\ 3 & -7 \end{bmatrix}$

$-14 - -18$

4

$\frac{1}{4}\begin{bmatrix} -7 & 6 \\ -3 & 2 \end{bmatrix}$

$\begin{bmatrix} -7/4 & 3/2 \\ -3/4 & 1/2 \end{bmatrix}$

Multiply.

6.) $\begin{bmatrix} 1 & 7 \\ 0 & 9 \end{bmatrix}\begin{bmatrix} 3 & -1 & 8 \\ 2 & -4 & 8 \end{bmatrix} = \begin{bmatrix} 17 & -29 & 64 \\ 18 & -36 & 72 \end{bmatrix}$

$2 \times 2 \quad 2 \times 3$

3 14   -1 -28   8 56

0 18   0 -36   0 72

Create two matrices for the situation, then use matrix multiplication to solve the problem

7. John and Phil decide to make two bouquets for their wives. John's bouquet contains 4 roses, 5 carnations and 3 lilies. Phil's bouquet contains 6 roses, 4 carnations and 3 lilies. Find the cost of each bouquet if each rose cost $3, each carnations cost $1.25 and each lily cost $4.

Way 1

$\begin{array}{c|ccc} & r & c & L \\ J & 4 & 3 & 3 \\ P & 6 & 4 & 3 \end{array} \cdot \begin{array}{c|c} & \$ \\ r & 3 \\ c & 1.25 \\ L & 4 \end{array} = \begin{array}{c|c} & \$ \\ J & 27.75 \\ P & 35 \end{array}$

$2 \times 3 \quad 3 \times 1$

Way 2

$\begin{array}{c|ccc} & r & c & L \\ \$ & 3 & 1.25 & 4 \end{array} \cdot \begin{array}{c|cc} & J & P \\ r & 4 & 6 \\ c & 3 & 4 \\ L & 3 & 3 \end{array} = \begin{array}{c|cc} & J & B \\ \$ & 27.75 & 35 \end{array}$

$1 \times 3 \quad 3 \times 2$

John spent $27.75 on his bouquet and Phil spent $35

8. A school store recorded how many pencils, erasers, and binders they sold for two different days. On Monday they sold 48 pencils, 7 erasers, and 9 binders. On Tuesday they sold 54 pencils, 10 erasers, and 6 binders. If the price of each pencil, eraser, and binder, respectively, is $0.20, $0.35, and $2.85, how much was made each day?

Way 1

$\begin{array}{c|ccc} & P & E & B \\ \$ & .20 & .35 & 2.85 \end{array} \cdot \begin{array}{c|cc} & m & t \\ P & 48 & 54 \\ E & 7 & 10 \\ B & 9 & 6 \end{array} = \begin{array}{c|cc} & m & t \\ \$ & 37.5 & 31.4 \end{array}$

$1 \times 3 \quad 3 \times 2$

Way 2

$\begin{array}{c|ccc} & P & E & B \\ m & 48 & 7 & 9 \\ t & 54 & 10 & 6 \end{array} \cdot \begin{array}{c|c} & \$ \\ P & .20 \\ E & .35 \\ B & 2.85 \end{array} = \begin{array}{c|c} & \$ \\ m & 37.5 \\ t & 31.4 \end{array}$

The school made $37.50 on monday and $31.40 on tuesday.