1.) Use matrices and elementary row operations to solve the following systems of equations.

a.) $\begin{cases} x + y = 2 \\ x - y = 3 \end{cases}$ 　　 b.) $\begin{cases} 2x - y = 1 \\ 3x + y = 0 \end{cases}$ 　　 c.) $\begin{cases} x + 2y + z = 3 \\ 2x + y + z = 16 \end{cases}$

d.) $\begin{cases} x + 2y + z = 3 \\ 2x + y + z = 16 \\ x + y + 2z = 9 \end{cases}$ 　　 e.) $\begin{cases} x - y + z = 1 \\ 2y - 3z = 0 \\ 3x + z = 2 \end{cases}$

f.) $\begin{cases} x + y - 3z + 2w = 0 \\ -2x - 2y + 6z + w = -5 \\ -x + 3y + 3z + 3w = -5 \\ 2x + y - 3z - w = 4 \end{cases}$ 　　 g.) $\begin{cases} 2x + y + z + w = 1 \\ x + 3y - 3z - 3w = 0 \\ -3x - 4y + 2z + 2w = -1 \end{cases}$

h.) $\begin{cases} 3x + y - z = -4 \\ 4x + 2y + z = 0 \\ 5x - y + 4z = 2 \end{cases}$ 　　 i.) $\begin{cases} x - y + z = 6 \\ 2x + 3y + 4z = 4 \\ 3x - 2y - 5z = 8 \\ -x + 5y + 9z = -4 \\ x + 4y + 3z = -2 \end{cases}$

j.) $\begin{cases} 5x + y - z + 2v - 3w = 3 \\ 3x - 2y + 2z - v + w = -2 \end{cases}$

2.) Peanut M & M's cost \$5/lb. and regular M & M's cost \$3/lb. How many pounds of each should be mixed to result in a ten pound mixture costing \$4.50/lb. ?

3.) The parabola $y = Ax^2 + Bx + C$ passes through the points $(-1, 1)$, $(1, -2)$, and $(4, 1)$. Solve for the unknown constants $A, B,$ and C.

4.) The cubic polynomial $y = Ax^3 + Bx^2 + Cx + D$ passes through the points $(-2, -2)$, $(-1, -3)$, $(1, 1)$ and $(2, 18)$. Solve for the unknown constants $A, B, C,$ and D.

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THE FOLLOWING PROBLEM IS FOR RECREATIONAL PURPOSES ONLY.

5.) Can you cut a freshly-baked, square, chocolate cake into 8 equal-sized pieces with exactly 3 straight cuts of the knife ?

Thanks to Dr. Kouba