SHOW YOUR WORK

1. Matrices $A = \begin{pmatrix} 4 & -2 \\ 1 & 3 \end{pmatrix}$ $B = \begin{pmatrix} 1 & -3 & 0 \\ 2 & 1 & -1 \end{pmatrix}$ $C = \begin{pmatrix} 2 & 7 \\ -1 & 5 \end{pmatrix}$

   a) Find $A + 2C$

   b) Find the product of $A$ and $B$.

   c) Find the Inverse of Matrix $C$ by applying the rule of matrix transformation.

   \[
   \begin{pmatrix} 2 & 7 \\ -1 & 5 \end{pmatrix}
   \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}
   \]

2. Evaluate Determinant $\begin{vmatrix} 1 & 2 & 3 \\ 3 & 1 & 2 \\ 2 & 3 & 1 \end{vmatrix}$ by Minors.

3. Use the result from question 4), find the Inverse of matrix $\begin{pmatrix} 1 & 2 & 3 \\ 3 & 1 & 2 \\ 2 & 3 & 1 \end{pmatrix}$ by short cut of 3x3 matrix

4. Solve $x$ and $y$ by Matrix Inversion: $2x + y = 3$
   
   $7x - 3y = -35$

5. Solve $x$ and $y$ by Algebra: $\frac{9}{x} + \frac{2}{y} = 1$

   $\frac{9}{x} - \frac{2}{y} = 5$
6. Solve $x, y$ and $z$ by Determinants: 
\[ x + 2y + z = 5 \]
\[ -2x + y = -5 \]
\[ y - z = -6 \]

7. The sum of the digits in a three-digit number is 12. The sum of the first and third digits is $\frac{1}{3}$ of the middle digit. If the hundreds and ones digit are interchanged, the value of the number is reduced by 99. Find the number.

8. Perform the indicated operations and Simplify.

1) \( \left( \frac{2a - 4b c^{6}}{54b^{3}c^{2} - a - 1} \right)^{\frac{1}{3}} \)

2) \( 2\sqrt{24} - 5\sqrt{72} + \sqrt{128} - \sqrt{150} \)

3) \( \sqrt[3]{1250m^{3}n} + \sqrt[3]{270m^{3}n} \)

4) \( \sqrt{\frac{k - 3}{k + 3}} \)

5) \( \frac{2}{\sqrt{5} + \sqrt{3}} \)

6) \( \frac{k^{3} - 9k}{k^{3} - k^{2} + 6k} \)