These problems are intended to be solved by means of

(a) augmented-matrix formation,

(b) by-hand Gauss-Jordan elimination, and

(c) RREF interpretation.

Use of other methods constitutes ducking out of what we want you to get out of matrix-algebra portion of the course.

1 Use the augmented-matrix-GJ method to solve the system:

$$\begin{aligned} 3x - 5y - 2z &= 17 \\ 5x - 6y - 2z &= 24 \\ -2x + 4y + 2z &= -12 \end{aligned}$$

You might want to switch equations 1 and 3 at the start. And then try it again without this move.

2 Do the lines

$$\begin{aligned} 3x + 2y &= 19 \\ 3x - 4y &= 7 \\ 5x + 3y &= 31 \\ 4x - 3y &= 14 \end{aligned}$$

have a point in common?

3 Find your calculus book and review partial-fractions decompositions. Then consider

$$\boldsymbol{P} = \frac{\boldsymbol{x^3 - 4x^2 + 12x - 34}}{\boldsymbol{(x^2 + 9)^2}}.$$

(a) Write down the partial-fractions decomposition *guess* for $\boldsymbol{P}$. This is a sum of fractions containing unknown parameters.

(b) Use the least common denominator and equate coefficients to find the equations for the PFD parameters.

(c) Write down the augmented matrix for the system of equations from part (b).

(d) Do the two simple pivot operations to solve the system for the PFD parameters.

(e) Write down the partial-fractions decomposition you have found.

4 Repeat the steps of problem 3 for the expression

$$\frac{\boldsymbol{3x^4 + 23x^3 + 99x^2 + 284x + 289}}{\boldsymbol{(x+3)^3\,(x^2+16)}}.$$

5 Here are some augmented matrices in RREF. They correspond to systems of equations in the variables named $\boldsymbol{x_1}$, $\boldsymbol{x_2}$, $\boldsymbol{x_3}$, $\boldsymbol{x_4}$, and so on. For each one, express all solutions of the original system using the vector-form formula.

(a) $\boldsymbol{A} = \left[\begin{array}{ccc|c} 1 & 0 & -5 & 0 \\ 0 & 1 & 2 & 8 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{array}\right]$

(b) $\boldsymbol{B} = \left[\begin{array}{ccc|c} 1 & 0 & 0 & 9 \\ 0 & 1 & 0 & -5 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{array}\right]$

(c) $\boldsymbol{C} = \left[\begin{array}{cc|c} 1 & 0 & 4 \\ 0 & 1 & -9 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{array}\right]$

(d) $\boldsymbol{D} = \left[\begin{array}{ccc|c} 1 & 0 & 6 & 0 \\ 0 & 1 & 3 & 0 \\ 0 & 0 & 0 & -2 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{array}\right]$

(e) $\boldsymbol{E} = \left[\begin{array}{ccc|c} 0 & 1 & 0 & 5 \\ 0 & 0 & 1 & 8 \\ 0 & 0 & 0 & 0 \end{array}\right]$

(f) $\boldsymbol{F} = \left[\begin{array}{ccccc|c} 1 & 0 & 2 & 0 & -2 & 7 \\ 0 & 1 & 8 & 0 & 3 & -2 \\ 0 & 0 & 0 & 1 & 2 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{array}\right]$

6 Dillingham has a collection of nickels, dimes, and quarters.

When he lines them up edge-to-edge with their centers on a straight line, the collection is **1295** ***mm*** long.

The collection weighs **154** ***grams.***

And is worth **$11.**

Pretend that the following data table reflects reality:

	nickels	dimes	quarters
Unit weight (gm):	2	1	3
Unit diameter (mm):	14	12	19

How many of each type of coin does Dillingham have in his collection?

