

Instructions: Show all work. Some problems will instruct you to complete operations by hand, some can be done in the calculator. To show work on calculator problems, show the commands you used, and the resulting matrices. **Give exact answers** (yes, that means fractions, square roots and exponentials, and not decimals) unless specifically directed to give a decimal answer. This will require some operations to be done by hand even if not specifically directed to. Be sure to complete all parts of each question.

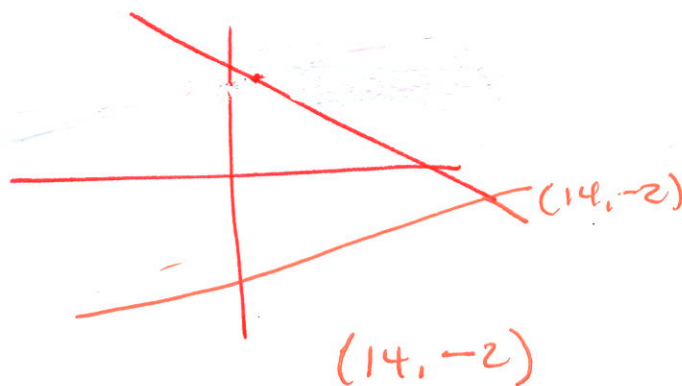
1. Solve the system $\begin{cases} \frac{x-2}{4} + \frac{y-1}{3} = 2 \\ x - 3y = 20 \end{cases}$ **graphically**. Describe the system as consistent or inconsistent.

Describe the solution (if it exists) as dependent or independent.

$$\begin{aligned} 3(x-2) + 4(y-1) &= 24 \\ 3x - 6 + 4y - 4 &= 24 \\ 3x - 10 + 4y &= 24 \\ \hline 3x + 4y &= 34 \end{aligned}$$

$$\begin{aligned} 3x + 4y &= 34 \\ 4y &= 34 - 3x \\ \hline 4y &= 34 - 3x \\ 4 & \end{aligned}$$

$$\frac{x-20}{3} = y$$



Consistent and independent

2. Solve the system $\begin{cases} x_1 + x_2 + x_3 = 0 \\ x_2 + 2x_3 = 0 \end{cases}$ using row operations (write the system as an augmented matrix first). Describe the system as consistent or inconsistent. Describe the solution (if it exists) as dependent or independent. If the system is dependent, write the solution in parametric form.

$$\left[\begin{array}{ccc|c} 1 & 1 & 1 & 0 \\ 0 & 1 & 2 & 0 \end{array} \right] \quad -R_2 + R_1 \rightarrow R_1$$

$$\left[\begin{array}{ccc|c} 1 & 0 & -1 & 0 \\ 0 & 1 & 2 & 0 \end{array} \right]$$

$$x_1 - x_3 = 0$$

$$x_2 + 2x_3 = 0$$

x_3 free

$$\Rightarrow \begin{aligned} x_1 &= x_3 \\ x_2 &= -2x_3 \\ x_3 &= x_3 \end{aligned}$$

$$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 1 \\ -2 \\ 1 \end{bmatrix} x_3 \quad \text{or if } x_3 = t \quad \vec{x} = \begin{bmatrix} 1 \\ -2 \\ 1 \end{bmatrix} t$$