

(1) Given a linear system

$$\begin{aligned}x_1 + 2x_2 + 3x_3 &= a \\4x_1 + 5x_2 + 6x_3 &= b, \\7x_1 + 8x_2 + 9x_3 &= c\end{aligned}$$

- (a) Is it possible for the linear system to have a unique solution, infinite number of solutions or no solution? Answer all three cases with reasons.
- (b) If $a = b = c = 1$, find the solution. If the system has infinite number of solutions, give the answer in vector form.

(2) Consider a linear system

$$\begin{aligned}ax + by &= e \\cx + dy &= f\end{aligned}\text{ where } a, b, c, d, e \text{ and } f \text{ are constants,}$$

- (a) Determine the relationship of a, b, c and d that make the system has a unique solution.
- (b) Find the unique solution in term of a, b, c, d, e and f . In addition, show that your answer is correct.