3.1 Exercises 

Problem 1 Use the method of elimination to determine whether the given linear system is **consistent** (has at least one solution) or **inconsistent** (has no solution). If the system is consistent, and if its solution is unique, provide it. Otherwise, describe the infinite solution set in terms of an arbitrary parameter t.

$x + 5y + 6z = 3$
$5x + 2y - 10z = 1$
$8x + 17y + 8z = 5$

Problem 2 Use the method of elimination to determine whether the given linear system is **consistent** (has at least one solution) or **inconsistent** (has no solution). If the system is consistent, and if its solution is unique, provide it. Otherwise, describe the infinite solution set in terms of an arbitrary parameter t.

$2x + 2y - 2z = 10$
$3x + y + 3z = 11$
$5z + 4x + y = 14$

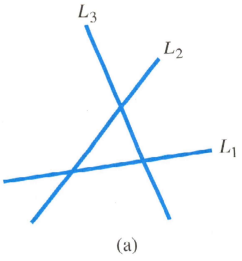
Problem 3 Given: $y'' - 10y' + 21y = 0$, and $y(x) = Ae^{3x} + Be^{7x}$, determine the constants A and B, so as to find a solution of the differential equation that satisfies the initial conditions: $y(0) = 15$, $y'(0) = 13$.

Problem 4

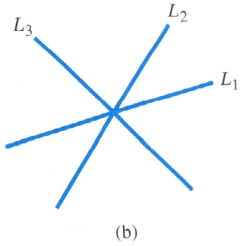
The linear system:

$$a_1x + b_1y = c_1$$
$$a_2x + b_2y = c_2$$
$$a_3x + b_3y = c_3$$

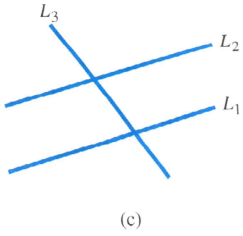
of three equations in two unknowns (x, y) represents three lines L_1, L_2, and L_3 in the xy-plane. The figures below show six possible configurations of these 3 lines. In each case, describe the solution set of the system:



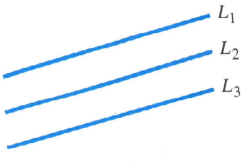
(a)



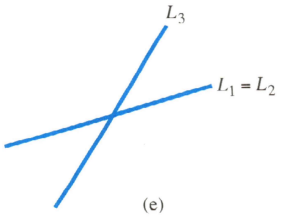
(b)



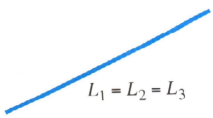
(c)



(d)



(e)



(f)