

Mathematics 1710 Exercise Set Number 12

1. Solve the following systems of two equations in two variables

(a)

$$\begin{cases} x + y = 8 \\ 2x - 3y = -1 \end{cases}$$

(b)

$$\begin{cases} 25x - 75y = 100 \\ -15x + 40y = 60 \end{cases}$$

2. Jill invested her total savings of \$15,000 from his summer work in two accounts one paying 8% and the other paying 5% simple interest. After one year the interest gained was \$1050. How much was invested in each account. Explicitly state the two linear equations involved in the solution.
3. Use Gaussian elimination to solve the following systems of equations. If the system has infinitely many solutions, find an expression describing the solutions, and if the system is inconsistent, explain why

(a)

$$\begin{cases} x + y + z = 2 \\ -x + 3y + 2z = 8 \\ 4x + y = 4 \end{cases}$$

(b)

$$\begin{cases} x + y - 3z = -1 \\ y - z = 0 \\ -x + 2y = 1 \end{cases}$$

(c)

$$\begin{cases} -x + 3y + z = 4 \\ 4x - 2y - 5z = -7 \\ 2x + 4y - 3z = 12 \end{cases}$$

4. Howard, who works as a lab technician in a chemistry laboratory, has been asked to create 100 ml of an 18% acid solution by mixing three other acid solutions of different concentrations. The first is 10% acid, the second 20% acid and the third is 40% acid. He further is instructed to use 4 times as much of the 10% solution as the 40% solution. How many millilitres of each solution should he use. Solve the problem with a careful application of Gaussian elimination.

5. A condominium management committee consists of a chair-person, a vice chair, and a secretary. In how many ways can such a committee be chosen from the 100 residents 60 of whom are women and 40 men, if the chair-person is to be a woman?
6. In the Olympic 100m race how many ways can the gold, silver and bronze medals be awarded if there are 50 contestants.
7. How many distinguishable permutations are there of the letters A,A,A,B,B,C,C,C,D,E,E.
8. Luigi's Pizza Parlour offers 15 different toppings and 3 different style crust. How many different pizzas are possible, if one of the toppings must be mushrooms?
9. You are dealt five cards from an ordinary deck of 52 playing cards. In how many ways can you get a full house? (A full house consists of 3 of a kind and 2 of another kind - for example 2-2-2-4-4 or Q-Q-Q-9-9).