1.10 Systems of Linear Equations

Question Paper

Course	DP IB Maths
Section	1. Number & Algebra
Topic	1.10 Systems of Linear Equations
Difficulty	Medium

Time allowed: 70

Score: /53

Percentage: /100

Question 1a

a)

Solve the following simultaneous equations.

$$5x - 3y = 19$$

$$2x + y = 1$$

[2 marks]

Question 1b

b)

$$a - 11b = 23$$
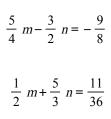
$$5a + 5b = -5$$

[2 marks]

Question 1c

c)

$$\frac{5}{4}m - \frac{3}{2}n = -\frac{9}{8}$$

$$\frac{1}{2}m + \frac{5}{3}n = \frac{11}{36}$$

[3 marks]

Question 2

Use the method of substitution to solve the following systems of linear equations.

(i)

$$x - y - z = 0$$
$$2x + y - 3z = 5$$
$$2x - 3y + 4z = 4$$

(ii)

$$2x - y - 3z = 3$$
$$3x + 2y - 2z = 12$$
$$2x + y + 2z = -7$$

[8 marks]

Question 3

A festival charges $\$x$ USD for an adult ticket, $\$y$ USD for a child ticket and $\$z$ USD for a car parking pass.

Given that 4 adult tickets, 7 child tickets and 2 car passes cost $540 USD, 2 adult tickets, 2 child tickets and 1 car pass cost $210 USD and 7 adult tickets and 3 car passes cost $450 USD,

(i)
set up a system of linear equations in three unknowns,

(ii)
find the values of x, y, and z.

[6 marks]

Question 4

Solve the following system of linear equations.

$$3x + 2y - z = 1$$

$$x - y + 5z = -2$$

$$2x + y = 3$$

[6 marks]

Question 5

Solve the following the system of linear equations.

$$2x + 2y - 3z = -8$$

$$3x + 2y - z = 0$$

$$x - y + z = 11$$

[6 marks]

Question 6a

Consider the system of equations

$$-6a + (k-3)b = 1$$

$$3ka - 5b = 4$$

a)
Find the values of the real parameter k such that the system has a unique solution.

[4 marks]

Question 6b

b)
Find the unique solution in terms of k.

[4 marks]

Question 7

Solve the following system of equations using row operations.

$$3x + 9y - 3z = 45$$

$$6x + 3y + 3z = 21$$

$$3x - 3y - 6z = 0$$

[6 marks]

Question 8

Consider the following system of equations

$$2x + y - 3z = -4$$

$$x - y + 2z = 2$$

$$4x + 2y - 6z = k$$

where $k \in \mathbb{R}$

Show that the system has no unique solution for any value of k.

[6 marks]