

QQQ – Decision 1 – Chapter 6 – Linear Programming (Version 1)

Total Marks: 25

(25 = Platinum, 23 = Gold, 20 = Silver, 17 = Bronze)

1. A firm is planning to produce two types of radio, type A and type B.

Market research suggests that, each week:

- At least 50 type A radios should be produced.
- The number of type A radios should be between 20% and 40% of the total number of radios produced.

Each type A radio requires 3 switches and each type B radio requires 2 switches. The firm can only buy 200 switches each week.

The profit on each type A radio is £15.

The profit on each type B radio is £12.

The firm wishes to maximise its weekly profit.

Formulate this situation as a linear programming problem, defining your variables.

(Total 7 marks)

2.

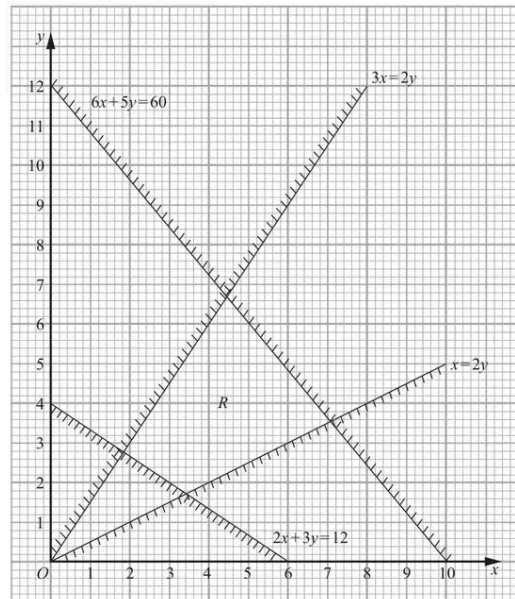


Figure 2

Figure 2 shows the constraints of a linear programming problem in x and y , where R is the feasible region.

- (a) Write down the inequalities that form region R . (2)

The objective is to maximise $3x + y$.

- (b) Find the optimal values of x and y . You must make your method clear. (4)

- (c) Obtain the optimal value of the objective function. (1)

Given that integer values of x and y are now required,

- (d) write down the optimal values of x and y . (1)

(Total 8 marks)

3.

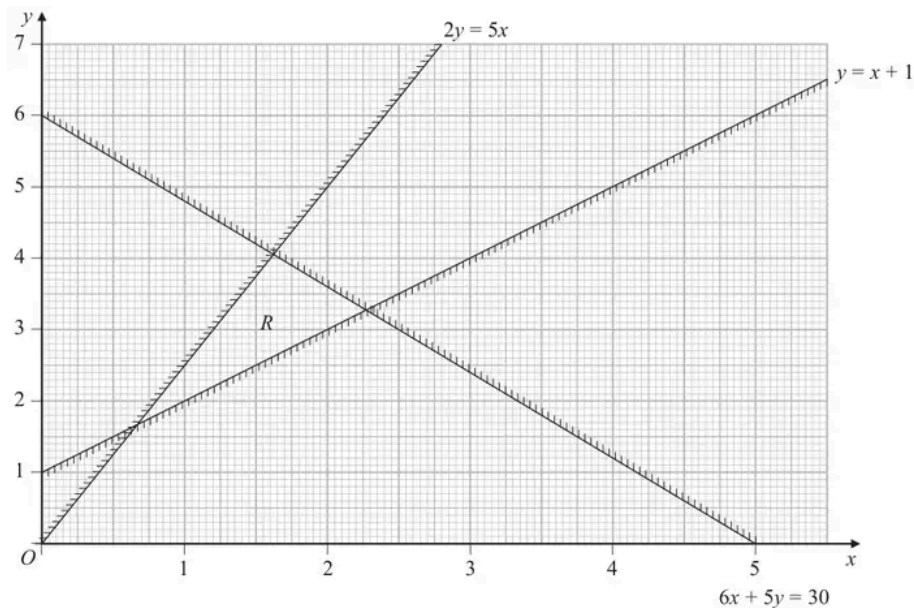


Figure 3

Figure 3 shows the constraints of a linear programming problem in x and y , where R is the feasible region.

- (a) Write down the inequalities that define R . (2)

The objective is to maximise P , where $P = 3x + y$

- (b) Obtain the exact value of P at each of the three vertices of R and hence find the optimal vertex, V . (4)

The objective is changed to maximise Q , where $Q = 3x + ay$. Given that a is a constant and the optimal vertex is still V ,

- (c) find the range of possible values of a . (4)

(Total 10 marks)