7.

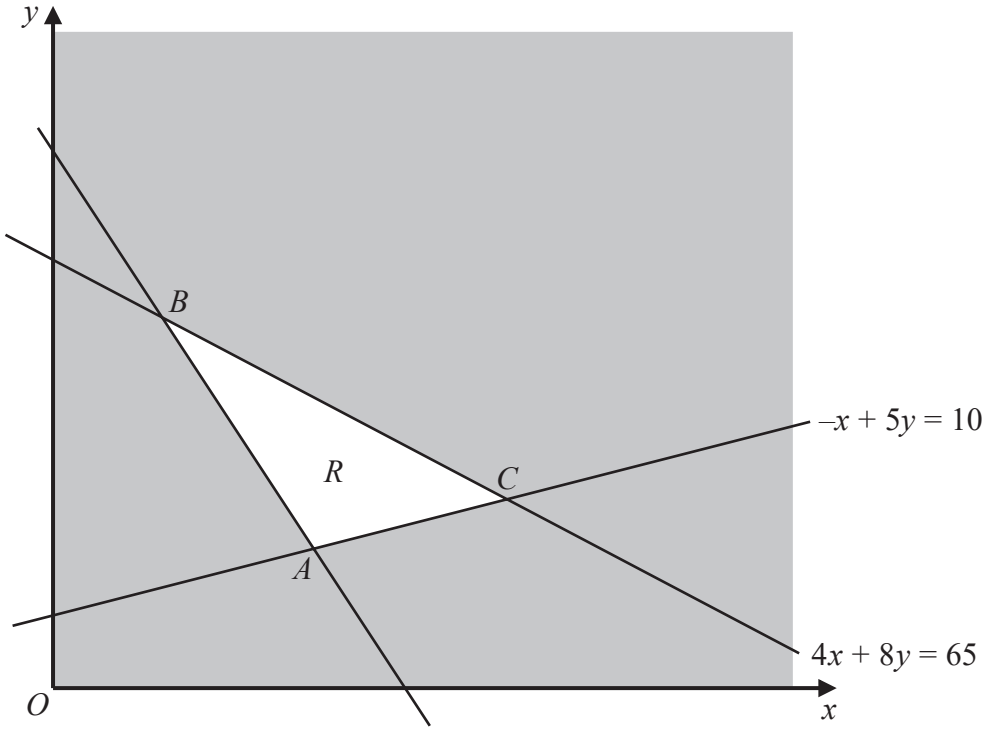


Figure 5

Figure 5 shows the constraints of a linear programming problem in x and y, where R is the feasible region. The equations of two of the lines and the three intersection points, A, B and C, are shown. The coordinates of C are $\left(\frac{35}{4}, \frac{15}{4}\right)$

The objective function is $P = x + 3y$

When the objective is to maximise $x + 3y$, the value of P is 24

When the objective is to minimise $x + 3y$, the value of P is 10

(a) (i) Find the coordinates of A and B.

(ii) Determine the inequalities that define R.

(8)

An additional constraint, $y \geqslant kx$, where k is a positive constant, is added to the linear programming problem.

(b) Determine the greatest value of k for which this additional constraint does not affect the feasible region.

(2)

(Total for Question 7 is 10 marks)

TOTAL FOR PAPER: 75 MARKS

END