7.

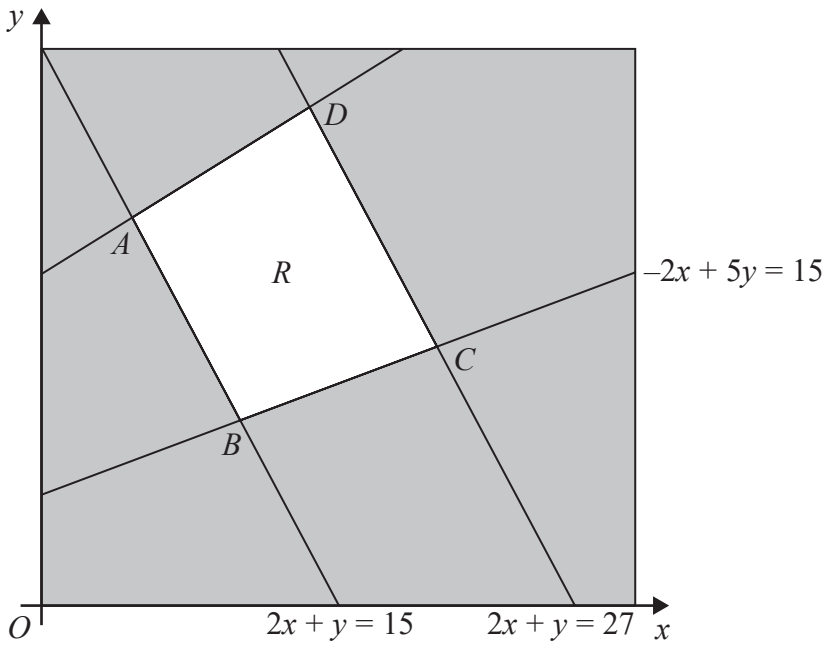


Figure 4

Figure 4 shows the constraints of a linear programming problem in x and y, where R is the feasible region.

The equations of three of the lines, and the four intersection points, A, B, C and D, are shown.

The four vertices of R are $A\left(\frac{9}{4},\frac{21}{2}\right)$, $B(5,5)$, $C(10,7)$ and $D\left(\frac{27}{4},\frac{27}{2}\right)$.

(a) Determine the inequalities that define R.

(4)

The objective function, P, is given by

$$P = 2x + ky$$

where k is a positive constant.

Given that the minimum value of P is at least half of the maximum value of P,

(b) determine the range of possible values of k.

(5)

(Total for Question 7 is 9 marks)

TOTAL FOR PAPER IS 75 MARKS