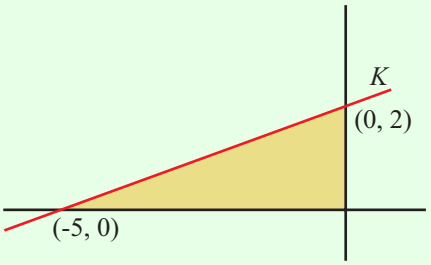
Linear Programming (Q 11, Paper 2)

2007

11 (a) The line K cuts the x-axis at $(-5, 0)$ and the y-axis at $(0, 2)$.



(i) Find the equation of K.

(ii) Write down the three inequalities that together define the region enclosed by K, the x-axis and the y-axis.

(b) A developer is planning a holiday complex of cottages and apartments.
Each cottage will accommodate 3 adults and 5 children and each apartment will accommodate 2 adults and 2 children.
The other facilities in the complex are designed for a maximum of 60 adults and a maximum of 80 children.

(i) Taking x as the number of cottages and y as the number of apartments, write down two inequalities in x and y and illustrate these on graph paper.

(ii) If the rental income per night will be €65 for a cottage and €40 for an apartment, how many of each should the developer include in the complex to maximise potential rental income?

(iii) If the construction costs are €200 000 for a cottage and €120 000 for an apartment, how many of each should the developer include in the complex to minimise construction costs?

Answers

11 (a) (i) $2x-5y+10=0$ (ii) $x \le 0,\ y \ge 0,\ 2x-5y+10 \ge 0$

(b) (i) $3x+2y \le 60,\ 5x+2y \le 80$

(ii) 10 cottages, 15 apartments

(iii) 16 cottages and 0 apartments