Example 1

(a) Solve the inequality $\dfrac{x+7}{x-1} \leq x+2$. Plot the solution on the number line and express the solution using interval notation. Hint: First write the inequality with zero on the right hand side, then get a common denominator on the left. **Do not clear the fraction.**

(b) Draw the graphs of the two functions $f(x) = \dfrac{x+7}{x-1}$ and $g(x) = x+2$ on the same set of axes. Find the points of intersection of the two graphs and explain how the solution in part (a) relates to the two graphs.

Example 2

(a) Find the equation of the line L_1 joining the points $A(2,1)$ and $B(4,4)$.

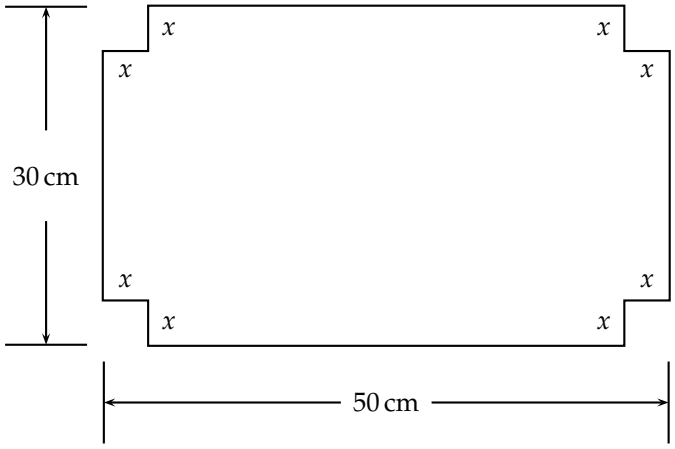
(b) Find the equation of the line L_2 through the point $C(1,6)$ that is parallel to the line L_1.

(c) Verify that the line joining the points B and C is perpendicular to lines L_1 and L_2. Use this fact to find the distance between lines L_1 and L_2.

(d) Find the area of the triangle ABC.

Example 3

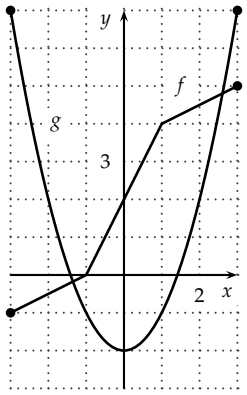
(a) A box with an open top is to be constructed from a rectangular piece of cardboard with dimensions 30 cm by 50 cm by cutting out equal squares of side length x at each corner and then folding up the sides, as shown. Express the volume V of the box as a function of x.



(b) Give the domain of the function in part (a) that makes sense for the problem stated. Plot the function from part (a) and from your graph estimate the value of x that gives the maximum volume of the box.

Example 4

The graphs of the two functions f and g are shown.



(a) Give the domain and range of both f and g.

(b) Solve the equation $g(x) = -1$.

(c) Given that the graph of g is a parabola, find a formula for the function g.

(d) Find a formula for the piecewise function f.