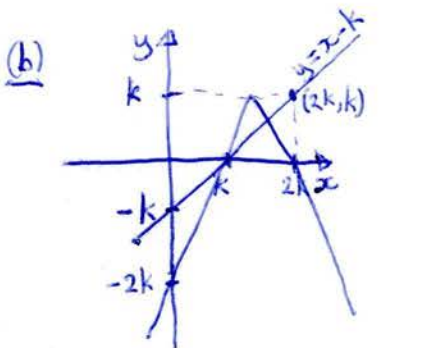




11.



intersections:
 $k - 2x + 3k = x - k \Rightarrow x = \frac{5k}{3}$
 $k + 2x - 3k = x - k \Rightarrow x = k$
 (3 marks)

From sketch, $f(x) > x - k$ for $\{x : x > k \text{ and } x < \frac{5k}{3}\}$ (1 mark)

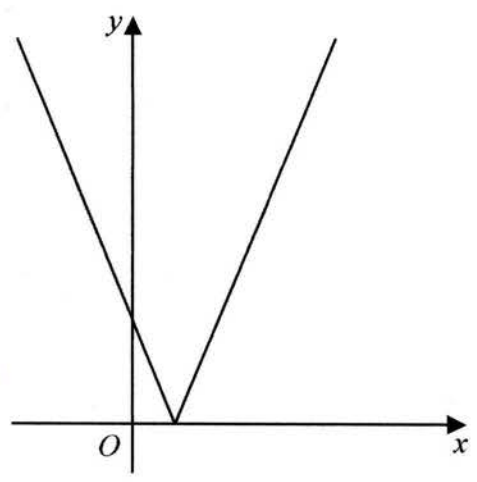


Figure 4

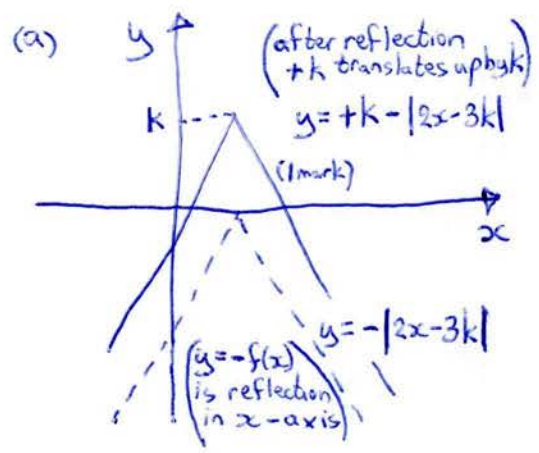
Figure 4 shows a sketch of the graph with equation

$$y = |2x - 3k|$$

where k is a positive constant.

(a) Sketch the graph with equation $y = f(x)$ where

$$f(x) = k - |2x - 3k|$$



stating

- the coordinates of the maximum point
- the coordinates of any points where the graph cuts the coordinate axes

(a) contd max when $2x - 3k = 0$
 $\Rightarrow x = \frac{3}{2}k$ so max $(\frac{3}{2}k, k)$ (1 mark)

(4)

(b) Find, in terms of k , the set of values of x for which

$$k - |2x - 3k| > x - k$$

(a) contd when $x = 0$,
 $y = k - |0 - 3k| = k - 3k = -2k$
 so $(0, -2k)$ (1 mark)

giving your answer in set notation.

(a) contd when $y = 0$,
 $k - 2x + 3k = 0 \Rightarrow x = 2k \Rightarrow (2k, 0)$
 $k + 2x - 3k = 0 \Rightarrow x = k \Rightarrow (k, 0)$ (4)

(c) Find, in terms of k , the coordinates of the minimum point of the graph with equation

$$y = 3 - 5f\left(\frac{1}{2}x\right)$$

(2)

(c) max. of $f(x)$ is $(\frac{3}{2}k, k)$ from (a)
 max. of $f(\frac{1}{2}x)$ is $(2 \times \frac{3}{2}k, k) = (3k, k)$
 max. of $5f(\frac{1}{2}x)$ is $(3k, 5k) = (3k, 5k)$
 min. of $-5f(\frac{1}{2}x)$ is $(3k, -5k)$
 min. of $3 - 5f(\frac{1}{2}x)$ is $(3k, 3 - 5k)$ (2 marks)