(a) Find the set of all real values of x for which $2x^2 + x - 15 \geq 0$. (10 marks) LC 2013

0, 3, 7, 10

$$(2x-5)(x+3) \geq 0$$

If $(2x-5)(x+3) = 0$

$x = 5/2$, $x = -3$

zero test $(2(0)-5)(0+3) = -15$ not ≥ 0

$\Rightarrow$ outside works

$$-3 \geq x \geq 5/2$$

(b) Find the set of all real values of x for which $\frac{2x-5}{x-3} \leq \frac{5}{2}$. (10 marks) LC 2012

0, 3, 7, 10

Multiply by $2(x-3)^2$

$$2(2x-5)(x-3) \leq 5(x-3)^2$$

$$2(2x^2-6x-5x+15) \leq 5(x^2-6x+9)$$

$$4x^2-22x+30 \leq 5x^2-30x+45$$

$$0 \leq x^2-8x+15 \geq 0$$

If $x^2-8x+15=0$

$(x-3)(x-5)=0$

$x=3$, $x=5$

zero test $15 \geq 0$ true $\Rightarrow$ outside works

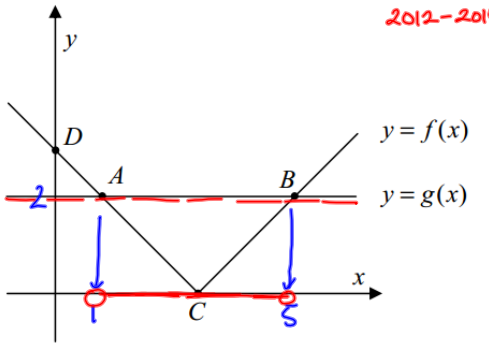
$$3 \geq x \geq 5$$

The graphs of the functions $f : x \mapsto |x-3|$ and $g : x \mapsto 2$ are shown in the diagram.

(15 Marks)
LC SAMPLE
2012–2014

(i) Find the co-ordinates of the points A, B, C and D.

0, 3, 4, 5



$A = (1, 2)$ $B = (5, 2)$

$C = (3, 0)$ $D = (0, 3)$

(ii) Hence, or otherwise, solve the inequality $|x-3| < 2$.

0, 5, 10

$1 < x < 5$