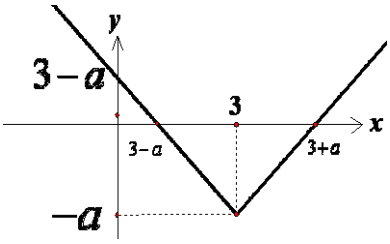
Topical Revision Paper 6

Term 2 Unit 6: Modulus Functions

Question 1:

Sketch the graph $y = |x-3| - a$ where $0 < a < 3$, showing clearly the intercepts with the axes. [3]

Solution:

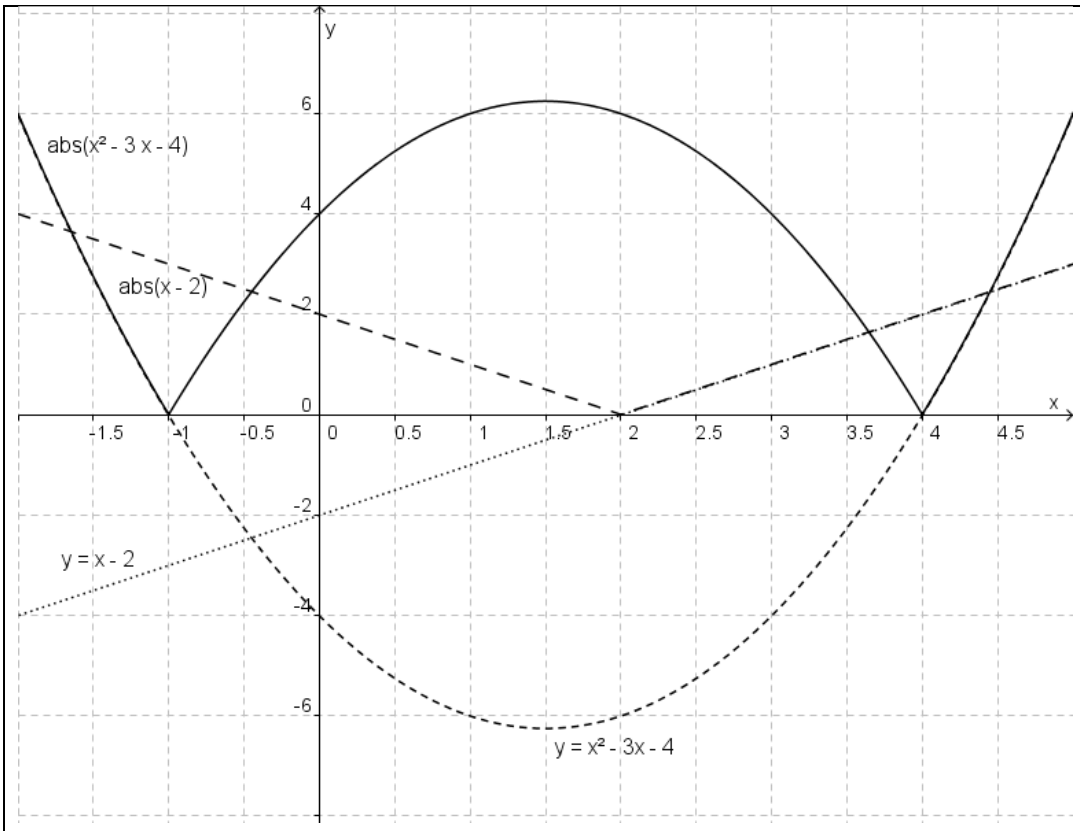


G1 – correct V-shaped
G1 – V-shape shifted to be right by 3 units.
G1 – V-shape shifted downwards by *a* units.

Question 2:

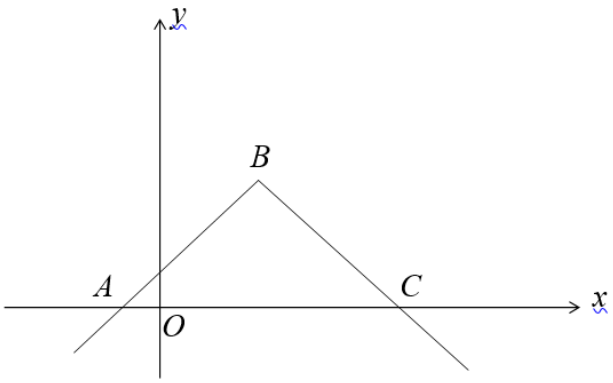
Sketch the graphs of $y = |x-2|$ and $y = |x^2 - 3x - 4|$ for the domain $-2 \le x \le 5$ on the same axes and hence state the number of solutions of the equation $|x-2| = |x^2 - 3x - 4|$. [5]

Solution:



No of solutions = 4

Question 3:



The diagram shows part of the graph of $y = 4 - |2x - 3|$.

(i) Find the coordinates of the points *A*, *B* and *C*. [4]

(ii) Solve the inequality $4 - |2x - 3| < x - 2$. [3]

(i)

$B\left(\frac{3}{2}, 4\right)$

$4 - |2x - 3| = 0$

$|2x - 3| = 4$

$2x - 3 = 4$ or $2x - 3 = -4$

$x = 3\frac{1}{2}$ or $x = -\frac{1}{2}$

$A\ (-\frac{1}{2}, 0)$

$C\ (3\frac{1}{2}, 0)$

(ii)

$4 - |2x - 3| < x - 2$

$|2x - 3| > 6 - x$

When $2x-3<0$, *i.e.* $x<\frac{3}{2}$

$2x-3<x-6 \Rightarrow x<-3$ (after combining with $x<\frac{3}{2}$)

When $2x-3\geq 0$, *i.e.* $x\geq\frac{3}{2}$

$2x-3>6-x \Rightarrow x>3$ (after combining with $x\geq\frac{3}{2}$)

$x < -3$ or $x > 3$

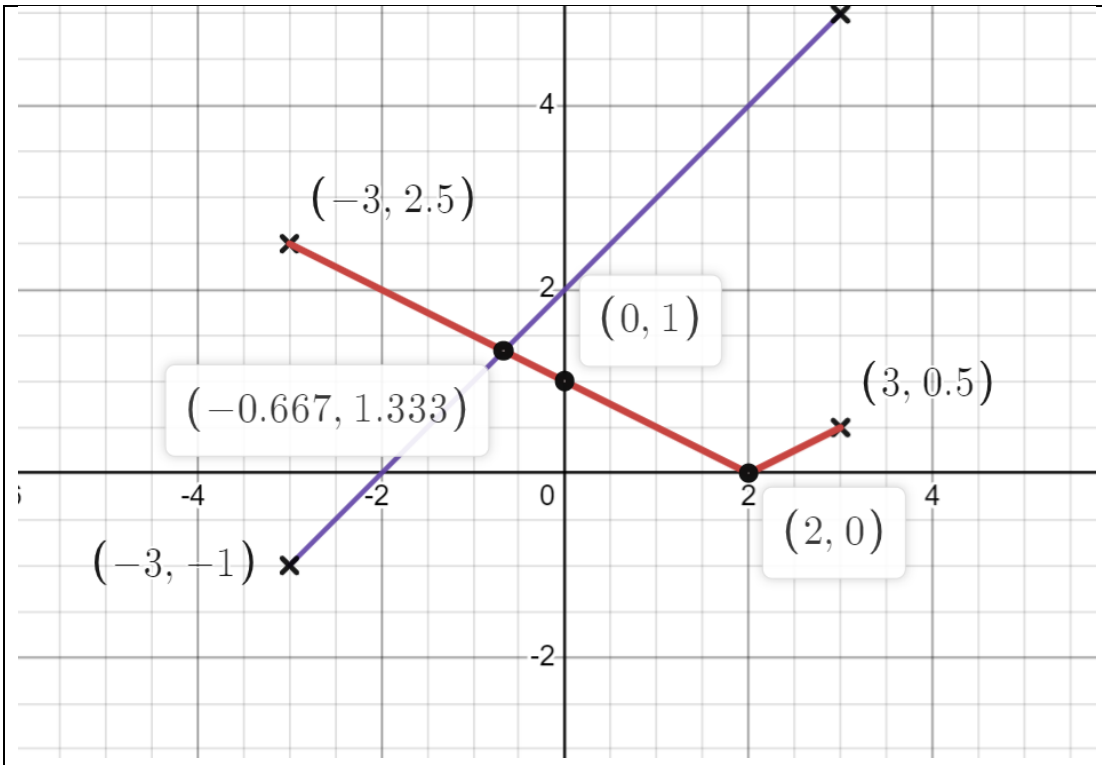
Question 5:

Sketch the graphs of $2y = |x - 2|$ and $y = x + 2$ for $-3 \leq x \leq 3$. Hence, or otherwise, solve the equation $\left|\frac{x-2}{2}\right| > x + 2$. [5]

Solution:

$2y = |x - 2|$

$y = \left|\frac{x-2}{2}\right|$



$x > -\frac{2}{3}$

$\left|\frac{x-2}{2}\right| = x+2$

$1-\frac{x}{2} = x+2$

$\frac{3x}{2} = -1$

$x = \frac{-2}{3}$