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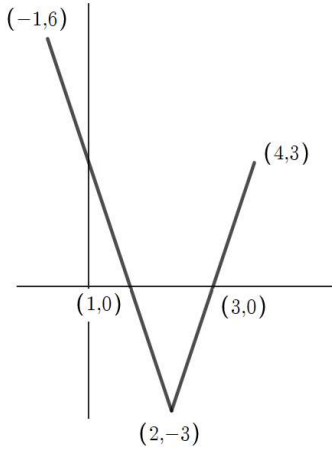
A LEVEL MATHS

(10) The Functions $y = |f(x)|$ and $y = f(|x|)$

WORKING AT D/E

(1) $f(x) = x^2 - x - 6,\ x \in R$
(a) Sketch the graph of $y = f(x)$ showing where the graph crosses the coordinate axes.
(b) Hence, sketch the graph of each of the following showing where the graph meets or crosses the coordinate axes: (i) $y = |f(x)|$ (ii) $y = f(|x|)$
(c) State **the number** of solutions to the equation $|x^2 - x - 6| = -3$

(2) The graph of $y = g(x)$ is shown below.



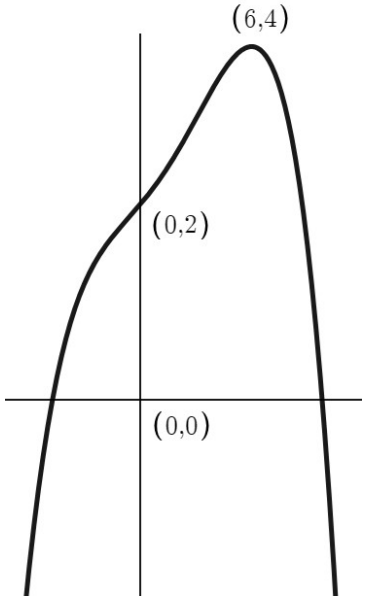
On separate diagrams, sketch the graphs of
(i) $y = |g(x)|$ and (ii) $y = f(|x|)$, stating points where the graph meets the coordinate axes and the coordinates of any turning points.

WORKING AT B/C

(1) (a) Sketch the graph of $y = e^{|x|}$ showing where the graph crosses the coordinate axes.
(b) Find the exact solutions to the equation $e^{|x|} = 4$

(2) (a) Sketch the graph of $y = |\ln(x - 5)|$ showing where the graph meets the x axis and writing down the equation of the vertical asymptote.
(b) Solve the equation $2 = |\ln(x - 5)|$ giving your answers in exact form.
(c) Sketch the graph of $y = \ln(|x|)$ labelling the equation of the asymptote.

(3) The graph of $y = g(x)$ is shown below



(a) How many solutions are there to the equation $|g(x)| = 1$?
(b) How many solutions are there to the equation $g(|x|) = 3$?

WORKING AT A*/A

(1) $f(x) = x^2 + x - 42$
(a) Sketch the graph of $y = f(x)$
(b) Solve the equation $|x|^2 + |x| - 42 = 0$
(c) Write down the minimum number of solutions to the equation $|f(x)| = a$ where a is a positive constant.

(2) (a) Sketch the graphs of $y = |\cos(x)|$ and $y = \sin(|x|)\ -180 < x < 180$ on the same set of axes.
(b) Solve the equation $\sin(|x|) = 0.5, -180 < x < 180$.
(c) Solve the equation $\sin(|x|) = |\cos(x)|, -180 < x < 180$.