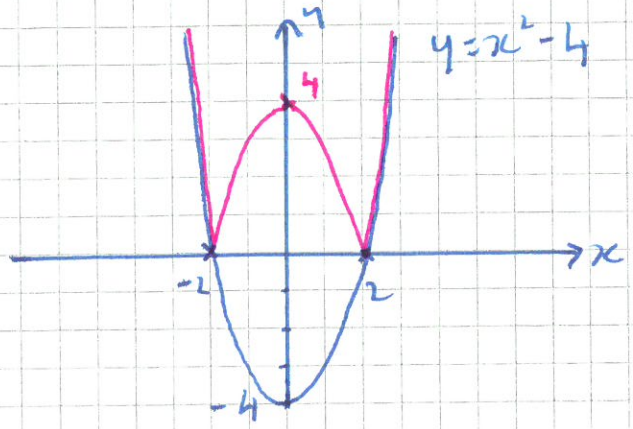
C3 - Modulus PPQ's

① (a) $y = x^2 - 4$ when $x = 0$, $y = -4$ $(0, -4)$

when $y = 0$ $x^2 - 4 = 0$

$x^2 = 4$

$x = \pm 2$



Now $y = |x^2 - 4|$

(b) $|5x - 3| > 4$

for true then either $5x - 3 > 4$

$5x > 4 + 3$

$5x > 7$

$x > \frac{7}{5}$

or $-(5x - 3) > 4$ ← inequality "flip"

$5x - 3 < -4$

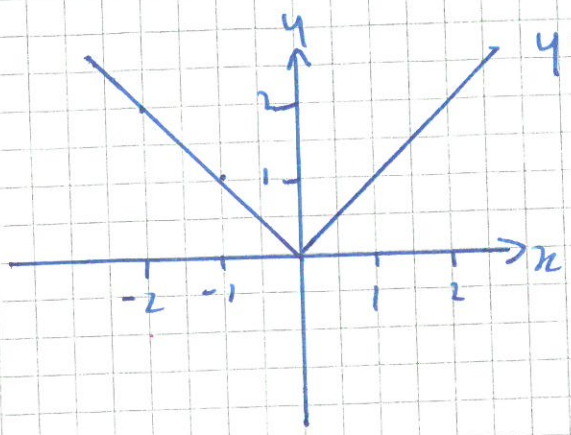
$5x < -4 + 3$

$5x < -1$

$x < -\frac{1}{5}$

$\therefore \quad x > \frac{7}{5}$ or $x < -\frac{1}{5}$

(2) (a)



(b) $|2x|+3 = 4$

$|2x| = 1$

either $2x = 1$ or $-2x = 1$

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

(c) $|3x+4| > 5$

either $3x+4 > 5$ or $-(3x+4) > 5$

$3x > 1$ $\quad x < -1$ $\quad 3x+4 < -5$

$x > \frac{1}{3}$ $\quad 3x < -9$

$x < -3$

So $x > \frac{1}{3}$ or $x < -3$

(3) (a) $3|x| + 4 = 6 - 2|x|$

$3|x| + 2|x| = 6 - 4$

$5|x| = 2$

$|x| = \frac{2}{5}$

either $x = \frac{2}{5}$ or $-x = \frac{2}{5}$

$x = -\frac{2}{5}$

(b) $|7x - 5| \geq 3$

either $7x - 5 \geq 3$ or $-(7x - 5) \geq 3$

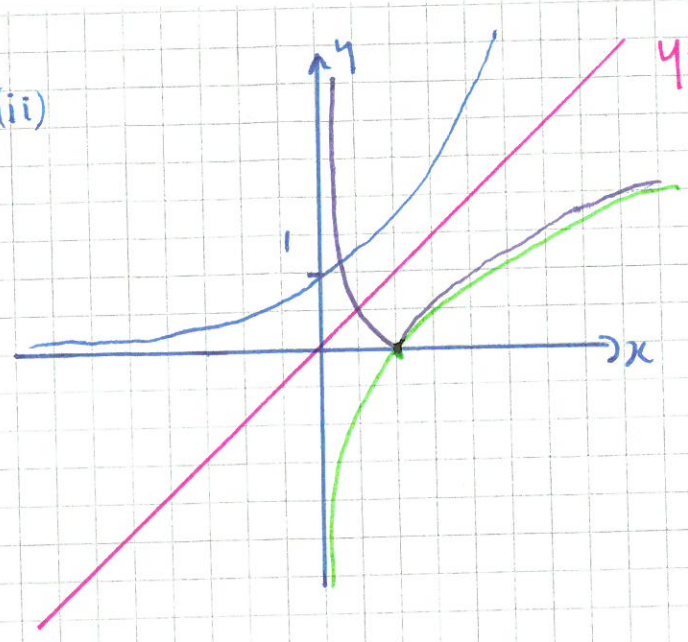
$7x \geq 8$ $7x - 5 \leq -3$

$x \geq \frac{8}{7}$ $7x \leq 2$

$x \leq \frac{2}{7}$

So $x \geq \frac{8}{7}$ or $x \leq \frac{2}{7}$

(4) (a) (i) & (ii)



(b) $|3x-2|<4$

either $3x-2<4$ or $-(3x-2)<4$

$3x<6$ $\quad 3x-2>-4$

$x<2$ $\quad 3x>-2$

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

$\therefore \quad -\frac{2}{3}<x<2$

(5) (a) $|3x-8| \leq 5$

either $3x-8 \leq 5$ or $-(3x-8) \leq 5$

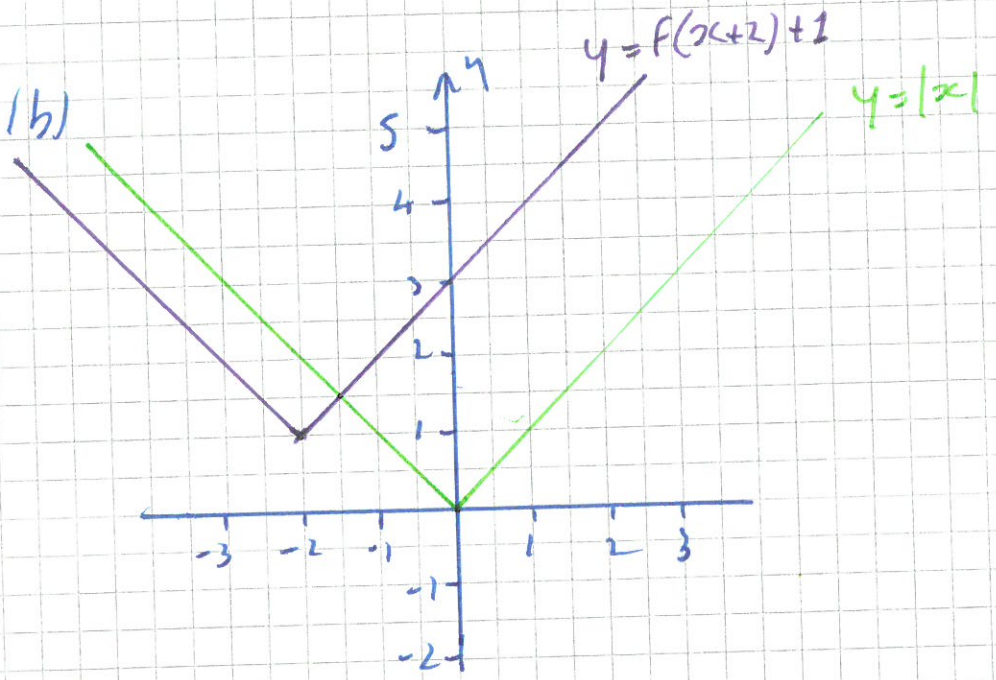
$3x \leq 13$ $3x-8 \geq -5$

$x \leq \frac{13}{3}$ $3x \geq 3$

$x \geq 1$

So $1 \leq x \leq \frac{13}{3}$

(b)



$y = f(x+2) + 1$ ← translation $\begin{pmatrix} -2 \\ +1 \end{pmatrix}$