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3.3

① a) $2x - y = 8$

$y = 2x - 8$

$y = 0$:

$0 = 2x - 8$

$8 = 2x$

$x = 4$ $(4, 0)$

$x = 0$:

$y = 2(0) - 8$

$y = -8$ $(0, -8)$

$4x + 3y = 6$

$y = -\frac{4}{3}x + 2$

$y = 0$:

$0 = -\frac{4}{3}x + 2$

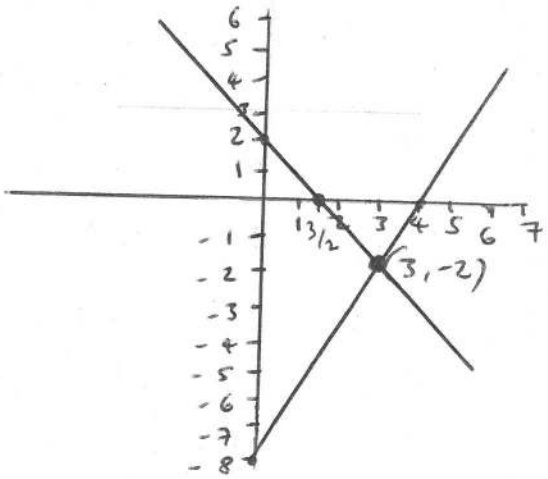
$-2 = -\frac{4}{3}x$

$x = \frac{3}{2}$ $\left(\frac{3}{2}, 0\right)$

$x = 0$:

$y = -\frac{4}{3}(0) + 2$

$y = 2$ $(0, 2)$



They both intersect at $(3, -2)$

b) $2x - 5y = 5$

$5y = 2x - 5$

$y = \frac{2}{5}x - 1$

$y = 0$:

$0 = \frac{2}{5}x - 1$

$-1 = \frac{2}{5}x$

$x = \frac{5}{2}$ $\left(\frac{5}{2}, 0\right)$

$x = 0$:

$y = \frac{2}{5}(0) - 1$

$y = -1$ $(0, -1)$

$3x - 2y = 13$

$2y = 3x - 13$

$y = \frac{3}{2}x - \frac{13}{2}$

$y = 0$:

$0 = \frac{3}{2}x - \frac{13}{2}$

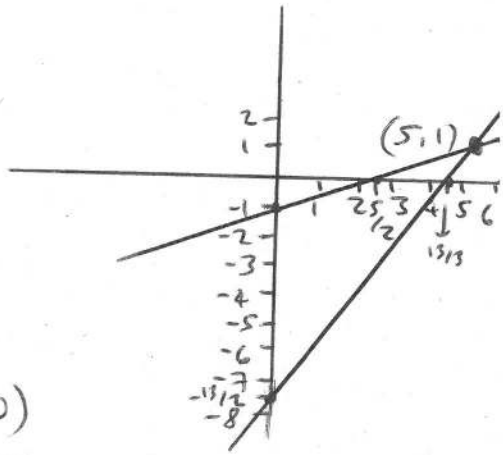
$\frac{13}{2} = \frac{3}{2}x$

$x = \frac{13}{3}$ $\left(\frac{13}{3}, 0\right)$

$x = 0$:

$y = \frac{3}{2}(0) - \frac{13}{2}$

$y = -\frac{13}{2}$ $\left(0, -\frac{13}{2}\right)$



They both intersect at $(5, 1)$

② a) $y = x^2 - 8x + 15$

$x = 5$ or $x = 3$

$(5, 0)$ $(3, 0)$

$y = 3x - 3$

$y = 0$: $0 = 3x - 3$

$3 = 3x$

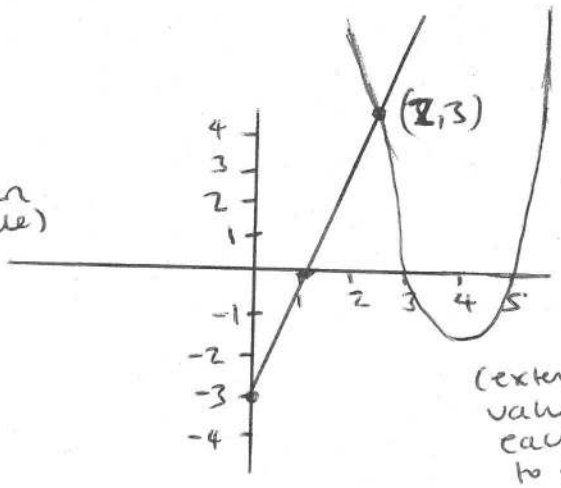
$x = 1$ $(1, 0)$

$x = 0$: $y = 3(0) - 3$

$y = -3$

$(0, -3)$

(Not drawn to scale)



(extend the values of each axis to get both solutions)

b) They intersect at $(9, 24)$ and $(2, 3)$

(2) c) (2, 3)

when $x = 2$:

$y = 3x - 3$

$y = 3(2) - 3$

$y = 3$

$y = x^2 - 8x + 15$

$y = (2)^2 - 8(2) + 15$

$y = 3$.

(9, 24)

when $x = 9$:

$y = 3x - 3$

$y = 3(9) - 3$

$y = 24$.

$y = x^2 - 8x + 15$

$y = (9)^2 - 8(9) + 15$

$y = 24$.

(3) a) $y = 3x^2 + 8x - 3$

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

$(\frac{1}{3}, 0)$ $(-3, 0)$

$y = 7x - 2$

$y = 0$:

$0 = 7x - 2$

$2 = 7x$

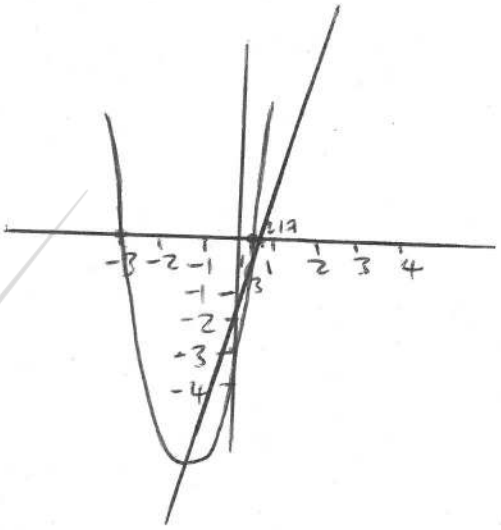
$x = \frac{2}{7}$ $(\frac{2}{7}, 0)$

$x = 0$:

$y = 7(0) - 2$

$y = -2$

$(0, -2)$



b) $(-0.77, -7.37)$ and $(0.43, 1.04)$
(or read from the graph)

(4) $y = x^2 - 4x + 16$

$y = x + 12$

Substitute $y = x + 12$ into $y = x^2 - 4x + 16$:

$x + 12 = x^2 - 4x + 16$

$0 = x^2 - 4x - x + 16 - 12$

$0 = x^2 - 5x + 4$

$x = 1$ or $x = 4$

$x = 1$:

$y = x + 12$

$y = 1 + 12$

$y = 13$

$x = 4$:

$y = x + 12$

$y = 4 + 12$

$y = 16$

A (1, 13). B (4, 16).

⑤ $y = -x^2 - 2x + 5$

$y = -2x + 1$

Substitute $y = -2x+1$ into $y = -x^2 - 2x + 5$:

$-2x + 1 = -x^2 - 2x + 5$

$x^2 - 2x + 2x + 1 - 5 = 0$

$x^2 - 4 = 0$

$x = 2$ or $x = -2$

$x = 2$:

$y = -2x + 1$

$y = -2(2) + 1$

$y = -3$

A $(2, -3)$

$x = -2$:

$y = -2x + 1$

$y = -2(-2) + 1$

$y = 5$

B $(-2, 5)$

⑥ a) $p(x) = 1 - \frac{1}{2}x$

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

$y = 0$:

$0 = -\frac{1}{2}x + 1$

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

$x = 2$

$(2, 0)$

$x = 0$:

$y = -\frac{1}{2}(0) + 1$

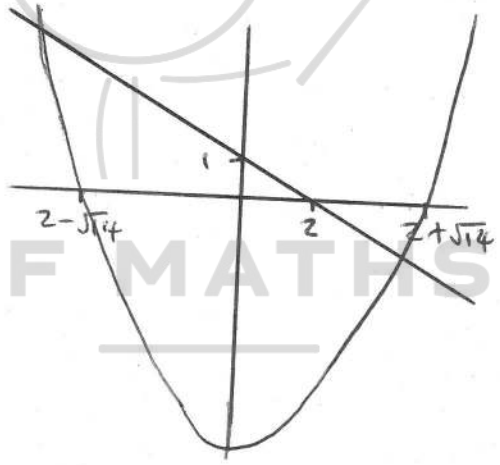
$y = 1$

$(0, 1)$

$q(x) = x^2 - 4x - 10$

$y = x^2 - 4x - 10$

$x = 2 + \sqrt{14}$ or $x = 2 - \sqrt{14}$



b) Substitute $y = -\frac{1}{2}x + 1$ into $y = x^2 - 4x - 10$

$-\frac{1}{2}x + 1 = x^2 - 4x - 10$

$0 = x^2 - 4x + \frac{1}{2}x - 10 - 1$

$0 = x^2 - \frac{7}{2}x - 11$ $(\times 2)$

$0 = 2x^2 - 7x - 22$

$x = -2$ or $x = \frac{11}{2}$

$x = -2$:

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

$y = -\frac{1}{2}(-2) + 1$

$y = 2$

$x = \frac{11}{2}$:

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

$y = -\frac{1}{2}(11/2) + 1$

$y = -\frac{7}{4}$

They intersect at $(-2, 2)$ and $\left(\frac{11}{2}, -\frac{7}{4}\right)$

(7) $y = 2x - 3\sqrt{x}$ and $y = 3x - 12$

$2x - 3\sqrt{x} = 3x - 12$

$2x - 3x = -12 + 3\sqrt{x}$

$-x = -12 + 3\sqrt{x}$

$x = 12 - 3\sqrt{x}$

$\frac{x - 12}{-3} = \frac{-3\sqrt{x}}{-3}$

$\sqrt{x} = \frac{12 - x}{3}$

$x = \left(\frac{12 - x}{3}\right)^2$

$x = \frac{(12 - x)^2}{9}$

$9x = (12 - x)^2$

$9x = 144 - 24x + x^2$

$0 = x^2 - 33x + 144$

$x = 27.83$ or $x = 5.175$

$x = 5.18$ (3SF)

(8) a) $f(x) = 6 - 5x$ and $g(x) = 4 - 0.5x$

$y = -5x + 6$ $y = -0.5x + 4$

$-5x + 6 = -0.5x + 4$

$-5x + 0.5x = 4 - 6$

$-\frac{9}{2}x = -2$

$x = \frac{4}{9}$

Substitute $x = \frac{4}{9}$ into 1 of the equations

$y = -5x + 6$

$y = -5(4/9) + 6$

$y = \frac{34}{9}$

So, $\left(\frac{4}{9}, \frac{34}{9}\right)$

(8) b) $f(x) = 6 - 5x$

$y = 0$:

$0 = 6 - 5x$

$-6 = -5x$

$x = \frac{6}{5}$ $\left(\frac{6}{5}, 0\right)$

$x = 0$:

$y = 6 - 5x$

$y = 6 - 5(0)$

$y = 6$

$(0, 6)$

$g(x) = 4 - 0.5x$

$y = 0$:

$0 = 4 - 0.5x$

$-4 = -0.5x$

$x = 8$ $(8, 0)$

$x = 0$:

$y = 4 - 0.5x$

$y = 4 - 0.5(0)$

$y = 4$

$(0, 4)$