

Question 2

- a) Expand and simplify $3x - (x + 3)^2$ (2)
- b) Factorise fully :
- (i) $16a^2 - 9$ (1)
 - (ii) $2x^2 - 2x - 24$ (1)
 - (iii) $x^3 + 8$ (1)
- c) Solve $3x^2 - 2x - 1 = 0$ (2)

Question 3

- a) Evaluate $-3|-2| + |-3|^2$ (1)
- b) Simplify:
- (i) $\frac{3x-6}{x} \times \frac{x}{x-2}$ (2)
 - (ii) $\frac{3x-6}{x} - \frac{x}{x-2}$ (2)
- c) Find the simultaneous solution to $5x - 2y = 1$
 $8x - y = -5$ (2)

Question 4

Solve:

- a) $|2x - 3| = 7$ (2)
- b) $|4 - x| < 5$ and show the solution on a number line (3)
- c) $9^{1-x} = \frac{3}{\sqrt{3}}$ (2)

Question 5

- a) Give the domain and range of each function :
- (i) $y = \sqrt{x-1}$ (2)
- (ii) $y = \frac{1}{x^2}$ (2)
- b) (i) Sketch the parabola $y = -x(x-3)$ for $0 \leq x \leq 4$ (2)
- (ii) Find the range for the above function given the restricted domain (1)

Question 6

Sketch each function below. Show x , y intercepts and other important points clearly:

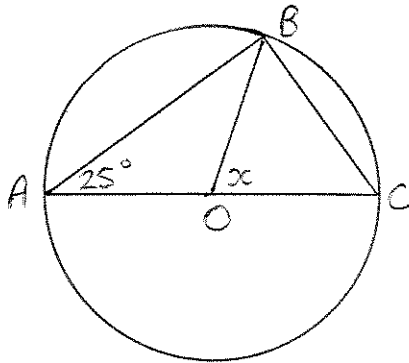
- a) $y = |x+1|$ (2)
- b) $y = \frac{-1}{x} + 2$ (2)
- c) $y = \begin{cases} x+1, & \text{for } x < 0 \\ x^2 - 4, & \text{for } x \geq 0 \end{cases}$ (3)

Question 7

- a) Given that $|x| = x$ if $x \geq 0$ and
 $|x| = -x$ if $x < 0$,
- (i) Simplify the function $y = x + |x|$ when (α) $x < 0$ (1)
- (β) $x \geq 0$ (1)
- (ii) Hence, or otherwise, sketch the function $y = x + |x|$ (1)
- b) Sketch the region satisfied by the intersection of $y \leq \sqrt{4-x^2}$ and $y > -3$ (4)

Question 8

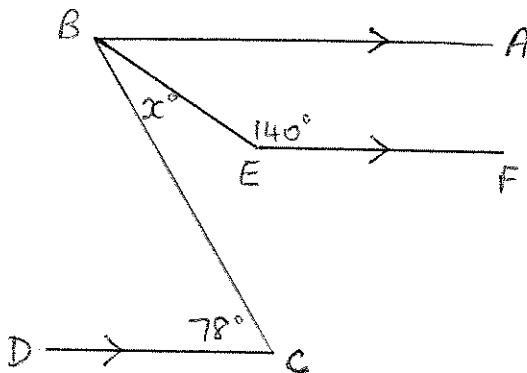
a)



Given a circle with diameter AC and centre O.

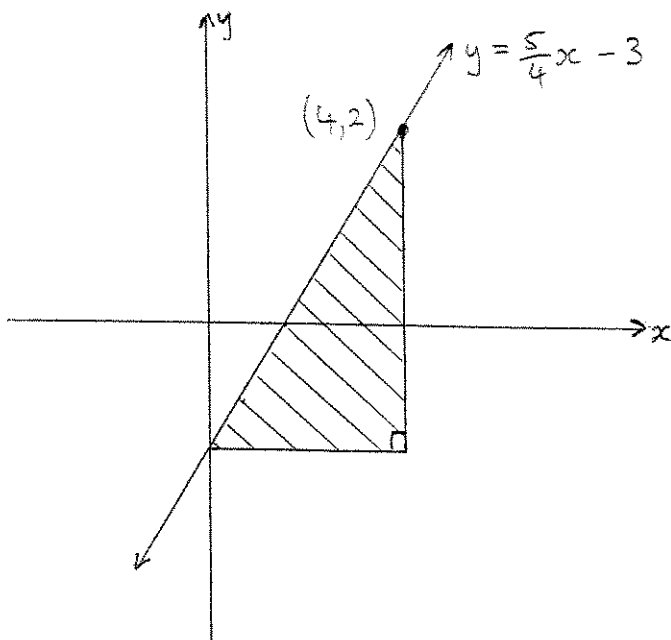
- (i) How do we know that $x = 50^\circ$? (2)
- (ii) Find the size of $\angle ABC$ (1)
(reasons not necessary)

b)



Find x , giving properly set out geometrical reasons. (2)

c) Find the inequalities whose intersection define the shaded region. (3)



SOLUTIONS.

1) a) 1.1×10^{12}
 \uparrow ① \uparrow ①

b) Let $x = 0.45555\dots$
 $10x = 4.5555\dots$
 $9x = 4.1$ } ① method
 $\therefore x = \frac{4.1}{9}$
 $= \frac{41}{90}$ ①

● $5\sqrt{2} + 6\sqrt{2} = 11\sqrt{2}$ ①

d) $\frac{\sqrt{2}}{3\sqrt{2}+1} \times \frac{3\sqrt{2}-1}{3\sqrt{2}-1} = \frac{6-\sqrt{2}}{17}$ ①

2

a) $3x - (x^2 + 6x + 9) = 3x - x^2 - 6x - 9$ ①
 $= -3x - x^2 - 9$ ①

● (i) $(4a+3)(4a-3)$ ①

(ii) $2(x-4)(x+3)$ ①

(iii) $(x+2)(x^2-2x+4)$ ①

c) $x = \frac{2 \pm \sqrt{4 - 4 \times 3 \times -1}}{6}$ ①
 $= \frac{2 \pm \sqrt{4+12}}{6}$
 $= \frac{2 \pm 4}{6}$
 $= 1 \text{ or } -\frac{1}{3}$ ①

3) a) $-3 \times 2 + 3^2 = -6 + 9$
 $= 3$ ①

b) (i) $3 \frac{(x-2)}{x} \times \frac{x}{x-2} = 3$ ①

(ii) $\frac{(3x-6)(x-2) - x^2}{x(x-2)}$ ①
 $= \frac{3x^2 - 12x + 12 - x^2}{x(x-2)}$
 $= \frac{2x^2 - 12x + 12}{x(x-2)}$ ①

c) $5x - 2y = 1$ — ①
 $8x - y = -5$ — ②

② $\times -2 : -16x + 2y = 10$ — ③

① + ③ : $-11x = 11$

$x = -1$ ← 1 mark

Sub in ① : $-5 - 2y = 1$

$-2y = 6$

$y = -3$ ← 1 mark

1 mark if method has an error but rest is OK

OR $(3x+1)(x-1) = 0$ ①

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

1 mark for only 1 answer

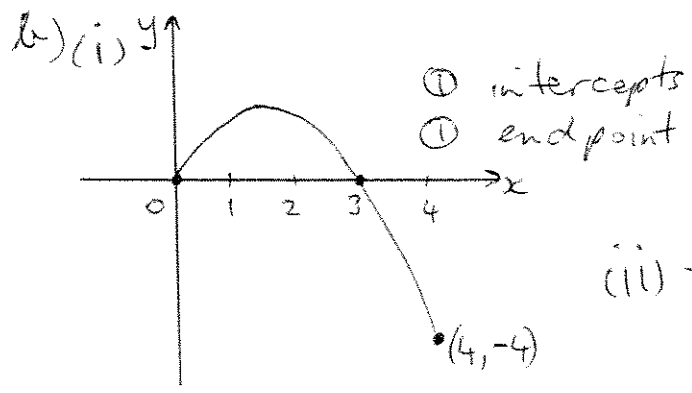
④ a) 1 mark for 2 equations
 $2x - 3 = 7$ or $-(2x - 3) = 7$
 $2x = 10$ or $-2x + 3 = 7$
 $x = 5$ ✓ $-2x = 4$
 $x = -2$ ✓
 $\therefore x = 5$ or -2 ①

b) $4 - x < 5$ or $-(4 - x) < 5$
 $-x < 1$ $-4 + x < 5$
 $x > -1$ ① $x < 9$ ①
 $\therefore -1 < x < 9$

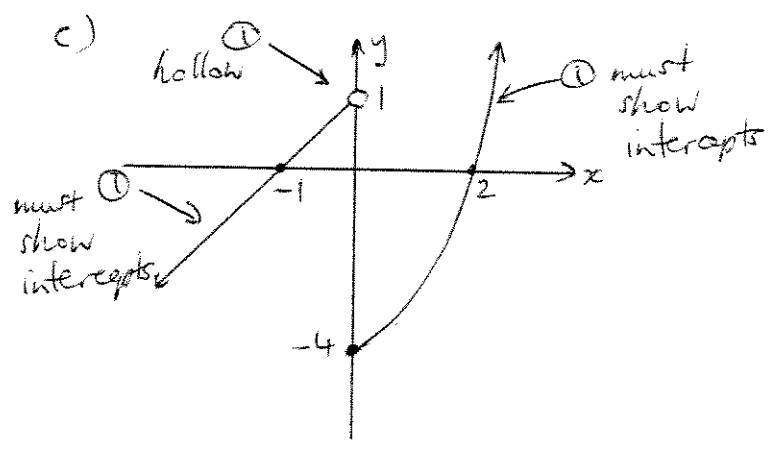
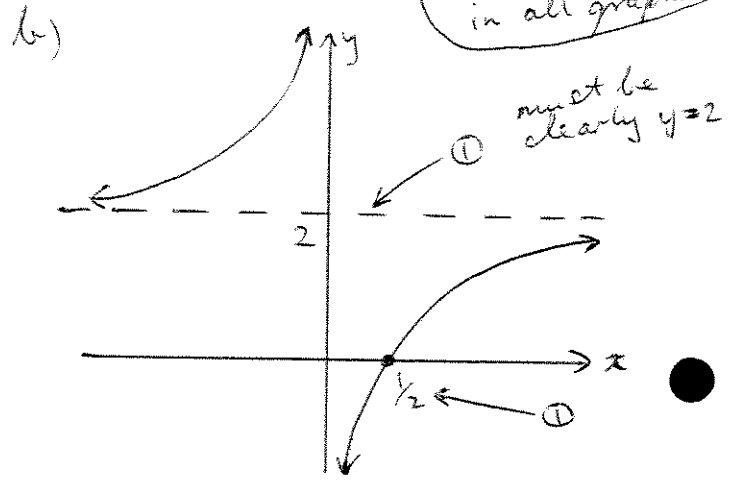
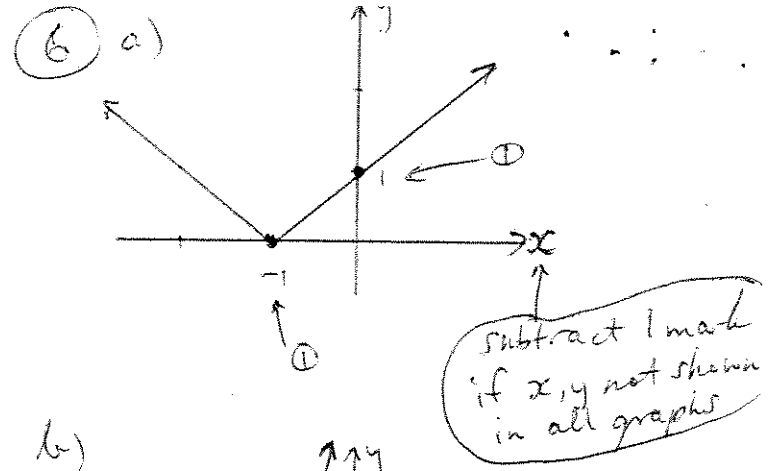


c) $(3^2)^{1-x} = 3^1 \div 3^{\frac{1}{2}}$
 $3^{2-2x} = 3^{\frac{1}{2}}$ ①
 $\therefore 2 - 2x = \frac{1}{2}$
 $\therefore -2x = -\frac{3}{2}$
 $\therefore x = \frac{3}{4}$ ①

⑤ a) (i) D: $x \geq 1$ ①
R: $y \geq 0$ ①
(ii) D: all x, except $x = 0$ ①
do not accept "except $x \neq 0$ "
R: $y > 0$ ①

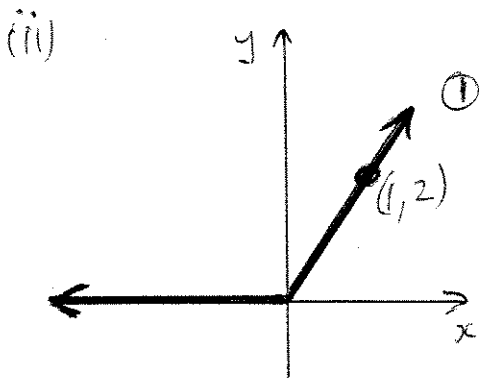


(ii) $-4 \leq y \leq 2\frac{1}{4}$ ①



7 a) (i) $y = x + (-x)$
 $\therefore y = 0$ ①

(ii) $y = x + x$
 $\therefore y = 2x$ ①



b) $\angle ABC = 102^\circ$ (alt. L's equal,
 $DC \parallel BA$) ①
 must have

$\angle ABE = 40^\circ$ (co-int. L's supp.
 $BA \parallel EF$) ①

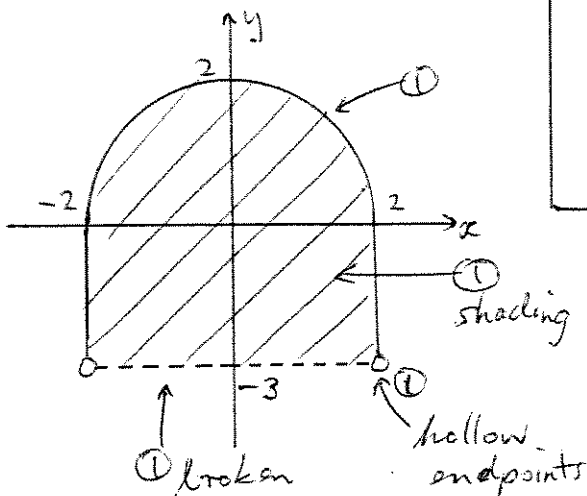
$\therefore x = 38^\circ$ must have

c) $y \leq \frac{5}{4}x - 3$ ①

$y \geq -3$ ①

$x \leq 4$ ①

b)



8 a) (i) $\triangle ABO$ is isosceles
 $(OA = OB)$
 $\angle ABO = 25^\circ$ (base L's equal) } ①
 $\therefore x = 50^\circ$ (ext. L of $\triangle ABO$) ①

(ii) 90° ①