

-- Year 11 Preliminary Mathematics --

Functions and Graphs Assignment

Question 1

Sketch the following functions,

- i) State the domain and range
- ii) Show all important features, including any x -intercept(s), y -intercept(s), and asymptotes.
 - a) $y = 2x + 1$
 - b) $y = x^2 + 2$
 - c) $y = |x + 2|$
 - d) $y = -\sqrt{9 - x^2}$
 - e) $y = \frac{3}{2x-1}$
 - f) $y = 2^x + 1$
 - g) $y = -(x - 2)^3$
 - h) $y = \sqrt{x} - 1$

Question 2

$$\text{If } f(x) = \begin{cases} 3 & \text{if } x \geq 1 \\ x^2 & \text{if } -1 < x < 1 \\ -x & \text{if } x \leq -1 \end{cases}$$

- a) Sketch the given function
- b) Evaluate $f(-2) + f(1) - f(0)$

Question 3

State the largest possible domain for the following functions:

- a) $f(x) = \sqrt{x - 1}$
- b) $f(x) = \frac{1}{x^2 - 4}$
- c) $f(x) = \sqrt{x^2 + 5x + 6}$
- d) $f(x) = \sqrt{x + 3} + \sqrt{2 - x}$

Question 4

State whether the function $g(x) = \frac{x}{x^2-1}$ is even, odd or neither.

Question 5

Determine the centre and radius of the circle $x^2 - 4x + y^2 - 6y = 0$.

Question 6

For $f(x) = x^2 - 2x + 3$:

- a) Sketch $f(x)$ showing x -intercept(s), y -intercept, axis of symmetry and vertex.
- b) Find the range of $f(x)$ for $-3 \leq x \leq 5$.

Question 7

Solve graphically $|2x + 1| < 3$

Question 8

Shade the region that satisfies:

- a) $y > x^2 + 2$ and $y \leq 3$
- b) $y \leq \sqrt{4 - x^2}$ and $y > x + 1$

Functions and Graphs Assignment

Question 1 on separate sheet

$$2. b) f(-2) = -(-2) \\ = 2$$

$$f(1) = 3$$

$$f(0) = 0$$

$$\therefore 2 + 3 - 0 = 5$$

$$5. x^2 - 4x + 4 + y^2 - 6y + 9 = 13$$

$$(x-2)^2 + (y-3)^2 = 13$$

$$\therefore C: (2, 3)$$

$$R = \sqrt{13}$$

$$3. a) D: x-1 \geq 0$$

$$x \geq 1$$

$$b) D: x^2 - 4 \neq 0$$

$$x^2 \neq 4$$

$$x \neq \pm 2$$

$$c) x^2 + 5x + 6 \neq 0$$

$$(x+3)(x+2) \geq 0$$

$$\cancel{D: x \geq 3} \quad x \geq -2$$

$$\therefore D: x \leq -3 \quad x \geq -2$$

$$d) x+3 \geq 0 \quad 2-x \geq 0$$

$$x \geq -3 \quad x \leq 2$$

$$\therefore D: -3 \leq x \leq 2$$

$$4. g(x) = \frac{x}{2x^2 - 1}$$

$$g(-x) = \frac{-x}{x^2 - 1}$$

$$= -g(x)$$

$$\therefore g(x) = \frac{x}{x^2 - 1} \text{ is odd}$$

$$6. \cancel{f(x)} = (x-3)(x+1)$$

a) On separate sheet

$$b) f(-3) = 18$$

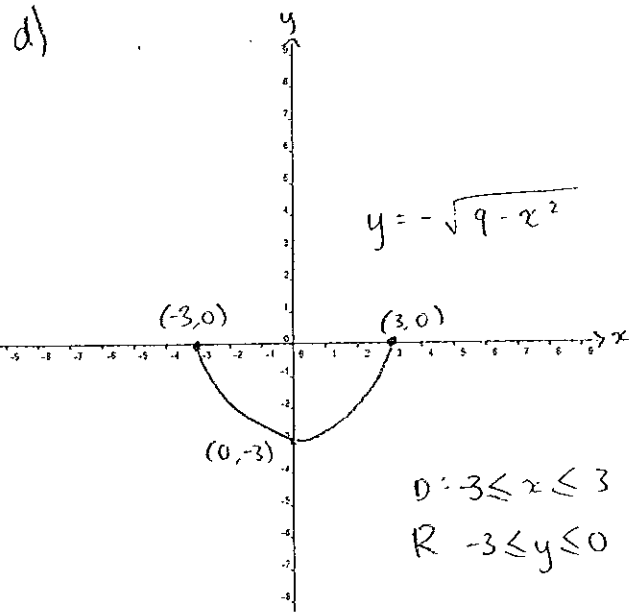
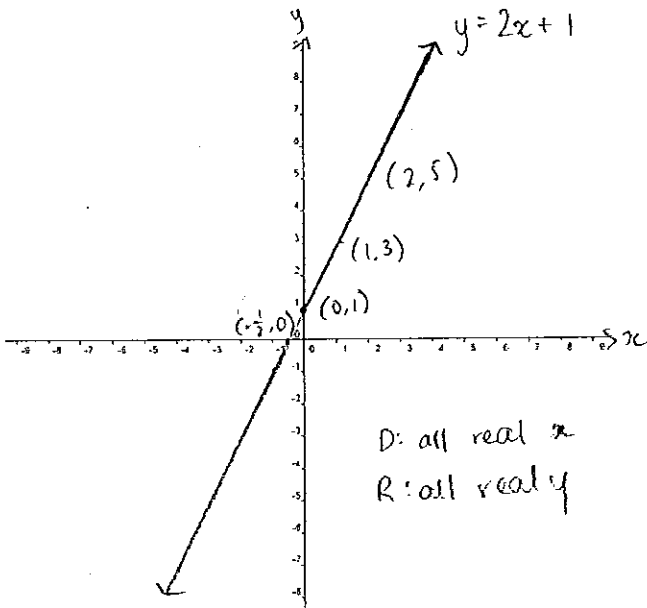
$$f(5) = 18$$

$$\therefore R: -4 \leq y \leq 18$$

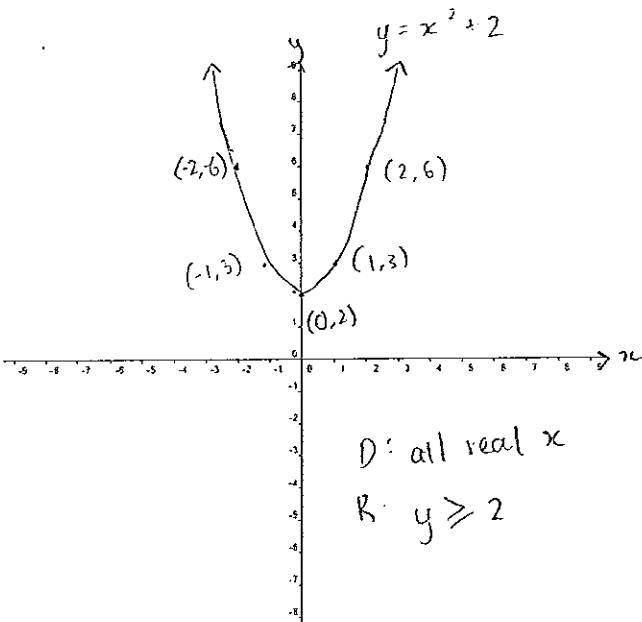
$$7. -2 < x < 1$$

8. On separate sheet

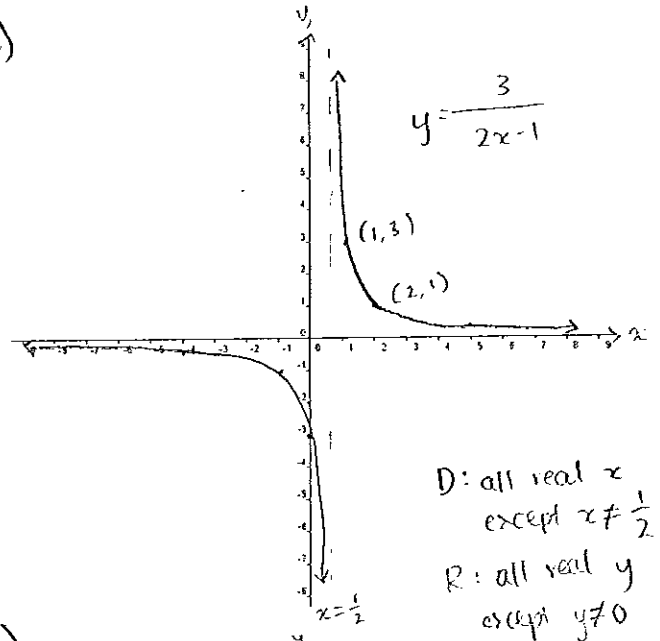
Q1 a)



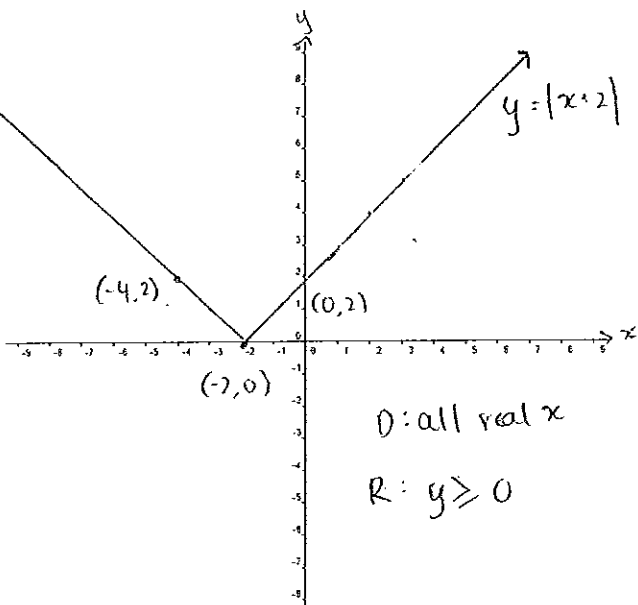
b)



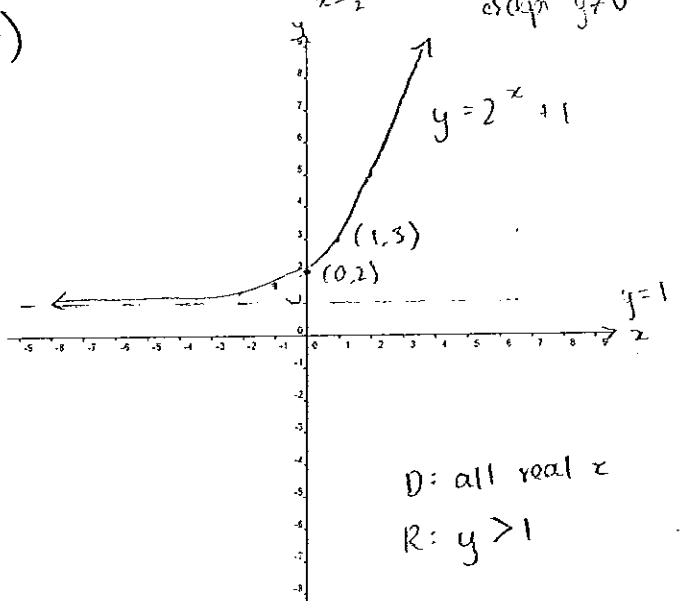
e)

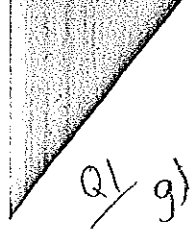


c)

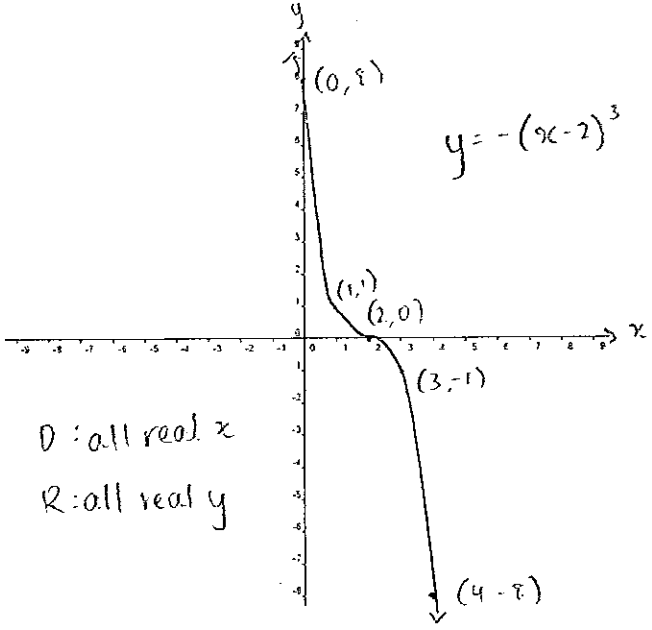


f)



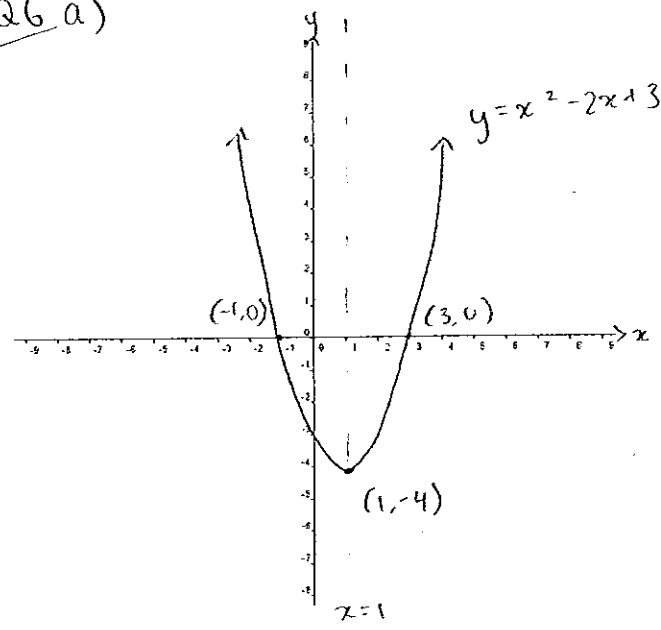


Q1 g)

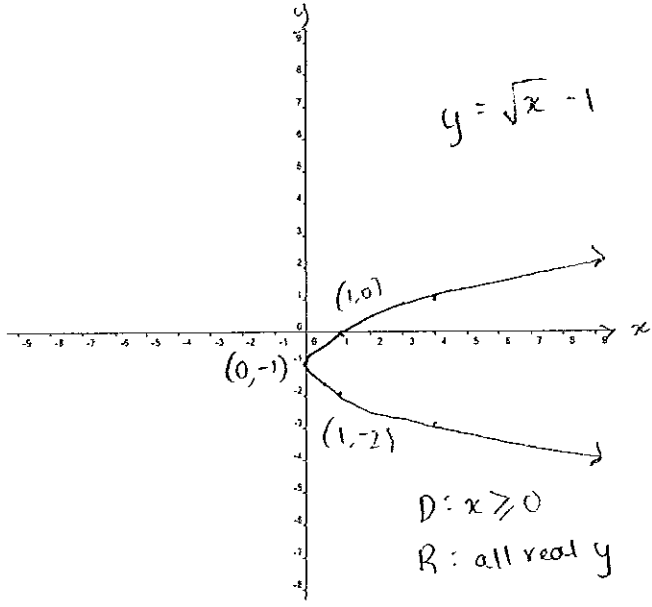


D: all real x
R: all real y

Q6 a)

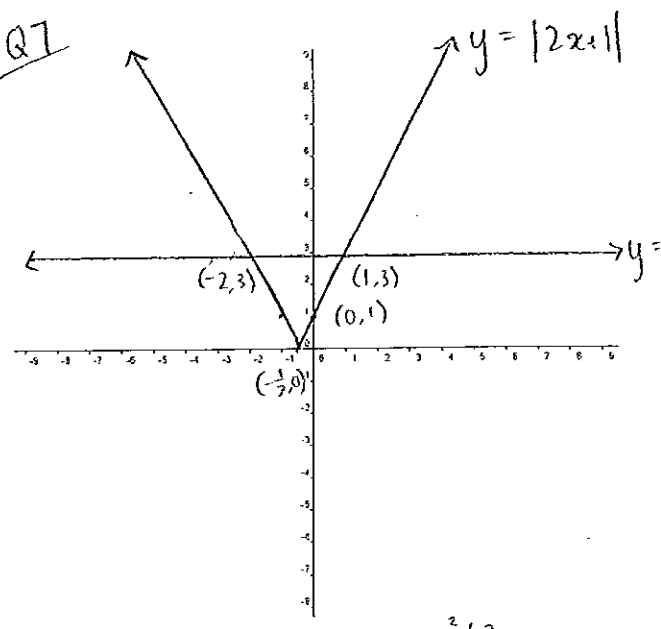


h)

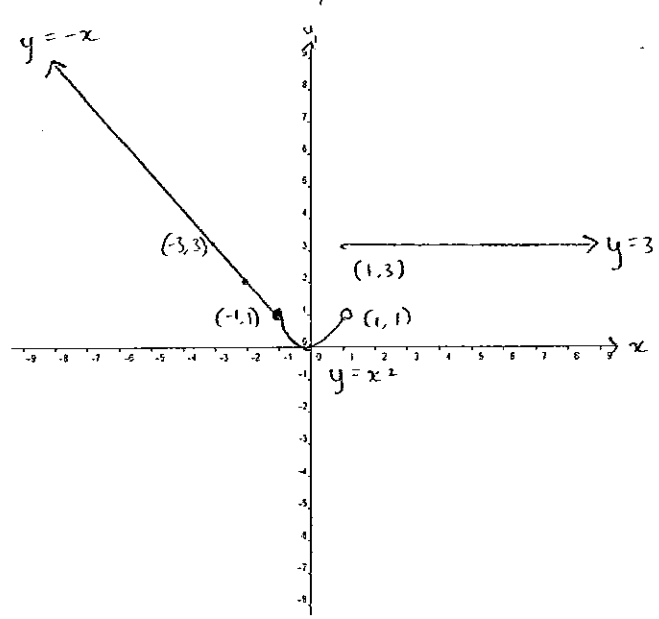


D: $x \geq 0$
R: all real y

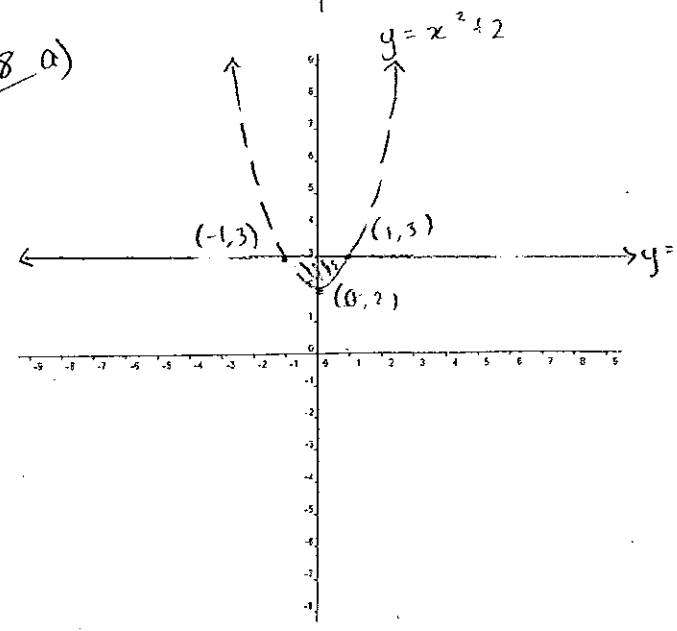
Q7



Q2 a)



Q8 a)



Q8 b)

