

Q1)

Q1) yes

Q2) $(2-x)^5$

$$\begin{array}{ccccccc}
 & & & & 1 & & \\
 & & & & & & 1 \\
 & & 1 & & & & 1 \\
 & 1 & & 2 & & & 1 \\
 & & 1 & & 3 & & 3 & & 1 \\
 & & & 1 & & 4 & & 6 & & 4 & & 1 \\
 & & & & 1 & & 5 & & 10 & & 10 & & 5 & & 1
 \end{array}$$

$$32 - 80x + 80x^2 - 40x^3 + 10x^4$$

$$\begin{aligned}
 &1 \cdot x^5 y^0 + 5x^4 y^1 + 10x^3 y^2 + 10x^2 y^3 \\
 &\quad + 5x^1 y^4 + 1x^0 y^5
 \end{aligned}$$

~~$$1 \cdot (2)^5 y^0$$~~

$$\begin{aligned}
 &1 \cdot x^5 (-2)^1 + 10x^3 (-2)^2 + 10x^2 (-2)^3 \\
 &= -x^5 - 40x^3 + 10x^4 + 80x^2 - 32
 \end{aligned}$$

$$32 - 80x + 80x^2 - 40x^3 + 10x^5$$

$$Q3) \frac{(x-x^2)}{x^3 \sqrt{x^2+1}} = 0$$

~~$$\frac{(x-x^2)}{x^3 \sqrt{x^2+1}}$$~~

~~2~~

$$\frac{x-x^2}{x^3 \sqrt{x^2+1}} = 0$$

$$\frac{1-x}{\sqrt{x^2}(x^2+1)}$$

$$1-x = \sqrt{x^2}(x^2+1) \times 0$$

$$1-x = 0$$

$$-x = 0 - 1$$

$$-x = -1$$

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

$$x = 1$$

$$\text{So } x = 1$$

$$Q4) \frac{x-x^2}{x^3\sqrt{x^2+1}} = 0$$

$$\frac{(x-x^2)}{x^3\sqrt{(x^2+1)}} = 0$$

$$\frac{x-x^2}{x^3\sqrt{(x^2+1)}} = 0$$

$$\frac{1-x}{\sqrt{x^2}(x^2+1)} = 0$$

$$1-x = \sqrt{x^2}(x^2+1) \times 0$$

$$\cancel{1-x} \quad 1-x = 0$$

$$\cancel{-x} \quad -x = 0 - 1$$

$$\cancel{-x} \quad -x = -1$$

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

$$x = 1$$

$$\text{So } 1 > 0$$

$$Q5) \frac{(x^3 - 9x^2 + 26x - 24)}{(x^2 - 9)} = 0$$

$$\frac{(x^3 - 9x^2 + 26x - 24)}{x^2 - 9}$$

$$x^3 - 9x^2 + 26x - 24 = 0$$

$$~~x^2~~ x^2 - 9 = 0$$

$$x^3 - 9x^2 + 26x - 24 = 0$$

$$(x-4)(x-3)(x-2) = 0$$

$$x-4=0 \quad x=0-(-4)=4 \quad x=4$$

$$x-3=0 \quad x=0-(-3)=3 \quad x=3$$

$$x-2=0 \quad ~~x=0-(-2)=2~~ \quad x=2$$

$$x=4$$

$$x=3$$

$$x-2=0 \quad x=2$$

$$3 < x < 4$$

$$\frac{\left(\frac{7}{2}\right)^3 - 9\left(\frac{7}{2}\right)^2 + 26\left(\frac{7}{2}\right) - 24}{\left(\frac{7}{2}\right)^2 - 9} > 0$$

$$\frac{\left(\frac{7}{2}\right)^3 - 9\left(\frac{7}{2}\right)^2 + 26 \times \frac{7}{2} - 24}{\left(\frac{7}{2}\right)^2 - 9}$$

$$= \frac{\frac{343}{8} - 441 + 91 - 24}{\frac{49}{4} - 9}$$

$$= \frac{-\frac{3}{8}}{\frac{13}{4}} > 0 \times \frac{13}{4}$$

$$= -\frac{3}{8} > 0 \times \frac{13}{4}$$

$$-\frac{3}{8} > 0 \quad -0.375 > 0$$

false

$$3 > 4$$

$$\frac{5^3 - 9 - 5^2 + 26 \times 5 - 24}{5^2 - 9} > 0$$

~~$$5^3 - 9$$~~

$$\frac{125 - 9 + 5^2 + 26 \times 5 - 24}{5^2 - 9}$$

~~$$125 - 9$$~~

$$\frac{125 - 225 + 26 \times 5 - 24}{5^2 - 9}$$

$$\frac{6}{16} > 0$$

$$\frac{6}{16} \times 16 > 0 \times 16$$

$$6 > 0 \times 16$$

$$6 > 0 \text{ true}$$

$$-3 < x < 2$$

$$\frac{(-1)^3 - 9(-1)^2 + 26(-1) - 24}{(-1)^2 - 9} > 0$$

$$\frac{60}{8} > 0$$

$$\frac{60}{8} \times 8 > 0 \times 8$$

$$60 > 0 \times 8$$

$$60 > 0$$

true

$$2 < x < 3$$

$$\frac{\left(\frac{5}{2}\right)^3 - 9\left(\frac{5}{2}\right)^2 + 26 \times \frac{5}{2} - 24}{\left(\frac{5}{2}\right)^2 - 9} > 0$$

$$\frac{\frac{3}{8}}{-\frac{11}{4}} > 0$$

$$\frac{\frac{3}{8}}{-\frac{11}{4}} \times \frac{11}{4} > 0 \times \frac{11}{4}$$

$$\frac{3}{8}(-1) > 0 \times \frac{11}{4}$$

$$-\frac{3}{8} > 0$$

$$-0.375 > 0 \quad \text{false} \quad -0.375 > 0$$

$x < -3$ not a ~~sol~~ solution

$-3 < x < 2$ is a ~~sol~~ solution

$2 < x < 3$ not a solution

$$x_4 = \frac{7}{2}$$

$$x_5 = 5$$

Q5) Continuation: also Q6 Same

$$x^2 - 9 = 0$$

$$x^2 = 0 - (-9)$$

$$x^2 = 9$$

$$x = \pm\sqrt{9}$$

$$x = \pm 3$$

$$x = 3 \quad x = -3$$

$$x = 4 \quad x = 3 \quad x = 2 \quad x = 3 \quad x = -3$$

$$x < -3$$

$$-3 < x < 2$$

$$2 < x < 3$$

$$3 < x < 4$$

$$x > 4$$

$$x_1 = -4$$

$$x_2 = -1$$

$$x_3 = \frac{5}{2}$$

$$x_4 = \frac{7}{2}$$

$$x_5 = 5$$

Evaluation

$$\frac{(-4)^3 - 9(-4)^2 + 26(-4) - 24}{(-4)^2 - 9} \stackrel{?}{> 0}$$

$$\frac{(-4)^3 - 9 \times 4^2 + 26(-4) - 24}{(-4)^2 - 9}$$

$$\frac{-64 - 9 \times 4^2 + 26(-4) - 24}{(-4)^2 - 9}$$

$$\frac{-64 - 144 - 104 - 24}{(-4)^2 - 9}$$

$$\frac{-64 - 144 - 104 - 24}{16 - 9}$$

$$\frac{-336}{16-9} = \frac{-336}{7}$$

$$\frac{-336}{7} \neq -48 \quad -48$$

-336 > 0 x 7
that is false -336 > 0

$$Q7 \quad \frac{a^5 - b^5}{a - b}$$

$$(a-b)(a^4 + a^3b + a^2b^2 + ab^3 + b^4)$$

$$a - b$$

$$a^4 + a^3b + a^2b^2 + ab^3 + b^4$$

$$4.2145a^4 + 4.2145a^3b + 4.2145a^2b^2 + 4.2145ab^3 + 4.2145b^4$$

$$Q8) \text{ GCD} = 2717, 1015$$

$$2717 = 11 \times 13 \times 17$$

$$1015 = 5 \times 7 \times 29$$

$$\text{GCD} = 1$$

$$\frac{2717}{1} = 2717$$

$$\frac{1015}{1} = 1015$$

$$Q9) \frac{x^2 + x - 2}{x^3 - x^2 - 1} \div x^5 - 3x^3 + x - 1$$

$$x^6 + x^4 - x$$

$$x^{11} - 2x^7 - 1$$

$$x^9 - 2x^7 - 1$$

$$x^2 + x - 2$$

$$x^2 + x - 2$$

$$x^3 - x^2 - 1$$

$$Q10) x^4 - 4, x^4 - 5x^2 + 6$$

$$\mathbb{R} (x^2 - 2) | (x^2 + 2)$$

$$x^2 = 2$$

$$x = \sqrt{2}$$

$$x^2 = -2 \quad x = \sqrt{-2}$$

$$x^4 - 5x^2 + 6$$

$$(x^2 - 3) | (x^2 - 2)$$

$$x^2 = 3$$

$$x\sqrt{3}$$

$$x^2 = 2$$

$$x = \sqrt{2}$$

$$Q(1) \quad -x^2 - x + 2 > 0$$

$$-2 < x < 1$$

$$x \in (-2, 1)$$

$$-1x^2 - 1x + 2 > 0$$

$$a = -1$$

$$b = -1$$

$$c = 2$$

$$ax^2 + bx + c > 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$a = -1$$

$$b = -1$$

$$c = 2$$

$$\Rightarrow \frac{-1 \cdot -1 \pm \sqrt{(-1)^2 - 4(-1)(2)}}{2(-1)}$$

$$x = \frac{-1 \cdot -1 \pm \sqrt{1 - 4(-1)(2)}}{2(-1)}$$

$$Q11) x = \frac{-1x-1 \pm \sqrt{1--4x2}}{2 \cdot x-1}$$

$$x = \frac{-1 \cdot -1 \pm \sqrt{1--8}}{2 \cdot -1}$$

$$x = \frac{-1 \cdot -1 \pm \sqrt{1+8}}{2 \cdot -1}$$

$$x = \frac{-1 \cdot -1 \pm \sqrt{9}}{2 \cdot -1}$$

$$x = \frac{-1 \cdot -1 \pm \sqrt{9}}{-2}$$

$$x = \frac{1 \pm \sqrt{9}}{-2}$$

$$x = \frac{1 \pm \sqrt{9}}{-2}$$

$$\sqrt{9} = \sqrt{3 \cdot 3}$$

$$\sqrt{3 \cdot 3} = \sqrt{3^2}$$

$$\sqrt{\cancel{x^2}} \sqrt{x^2} = x$$

$$\sqrt{3^2} = 3$$

$$x = \frac{1+3}{-2}$$

$$x_1 = \frac{1+3}{-2} \quad \text{and} \quad x_2 = \frac{1-3}{-2}$$

$$x_1 = \frac{1+3}{-2}$$

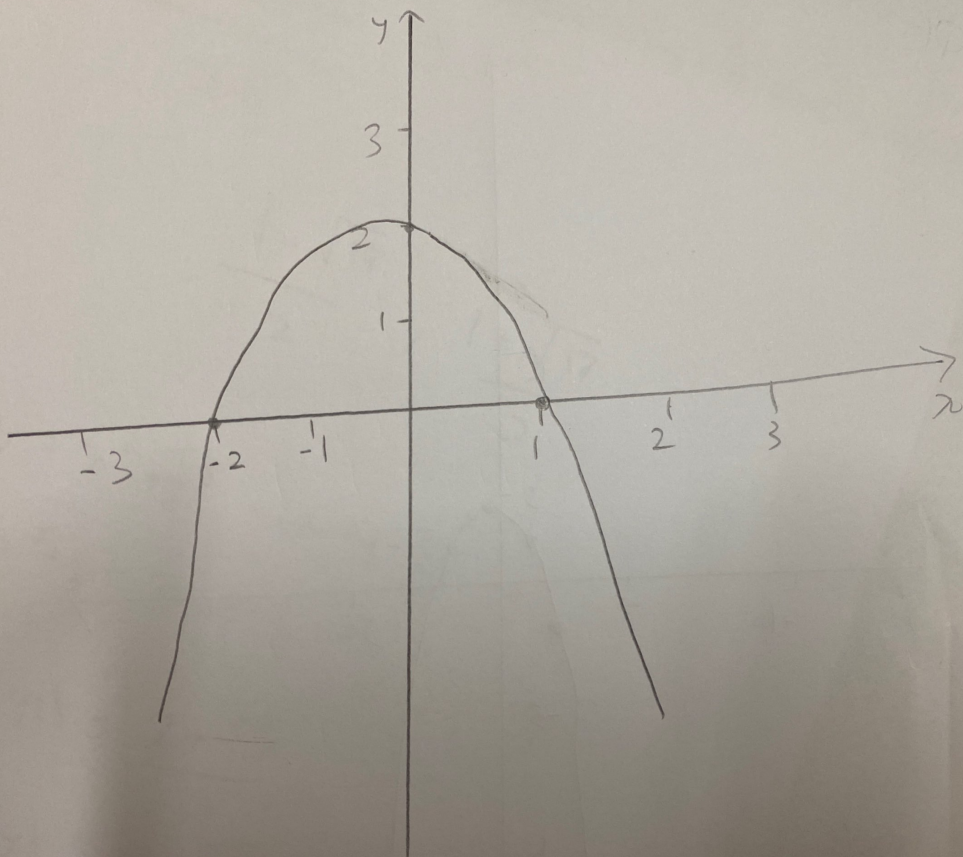
$$x_1 = \frac{4}{-2}$$

$$x_1 = -2$$

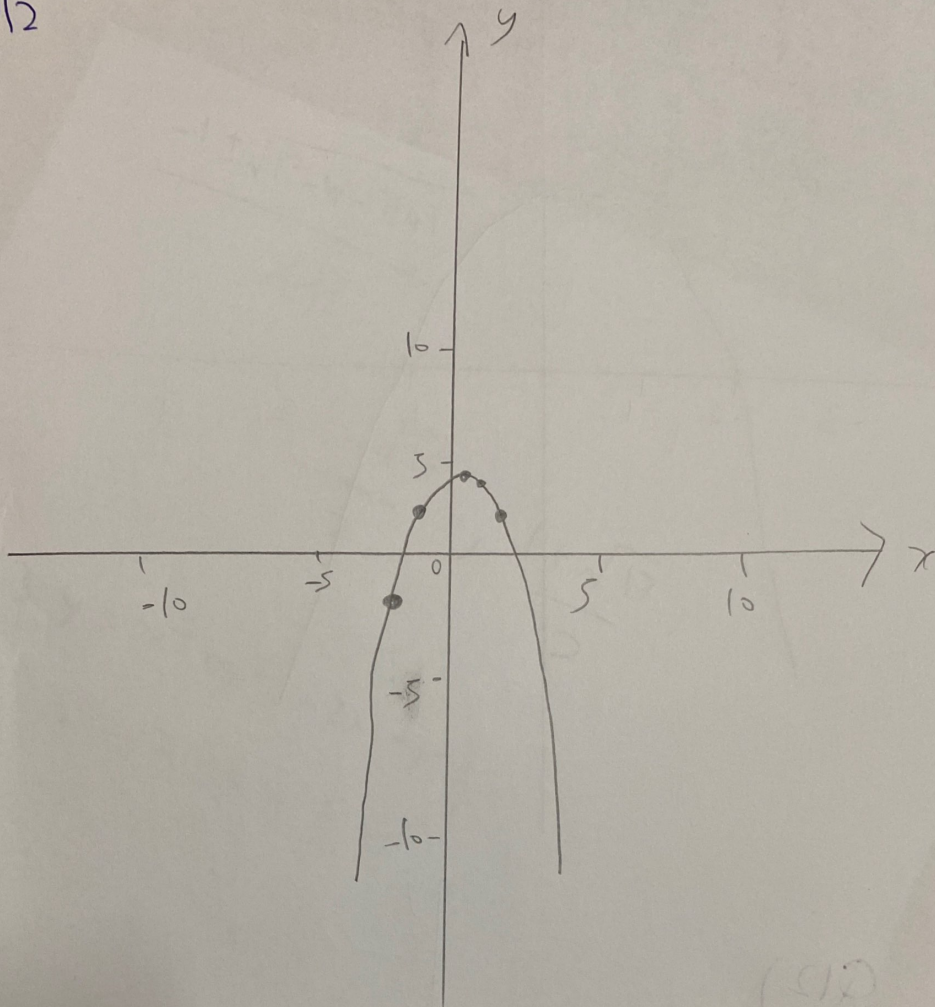
$$x_2 = \frac{1-3}{-2}$$

$$x_2 = \frac{-2}{-2}$$

$$x_2 = 1$$



Q12



x	y
-2	-2
-1	2
$\frac{1}{2}$	$\frac{17}{4}$
1	4
2	2

$$\left(\frac{1}{2}, \frac{17}{4}\right) \quad x = \frac{1}{2}$$

$$\left(\frac{1}{2}, 4\right)$$

We also use quadratic equation

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-1 \pm \sqrt{1^2 - 4(-1)(4)}}{2(-1)}$$

$$\frac{-1 \pm \sqrt{1^2 - 4(-1)(4)}}{2(-1)}$$

$$\frac{1 - \sqrt{17}}{2}, \frac{1 + \sqrt{17}}{2}$$

$$Q13 \quad y = x^2 + y^2 - 2x - y = \frac{3}{4}$$

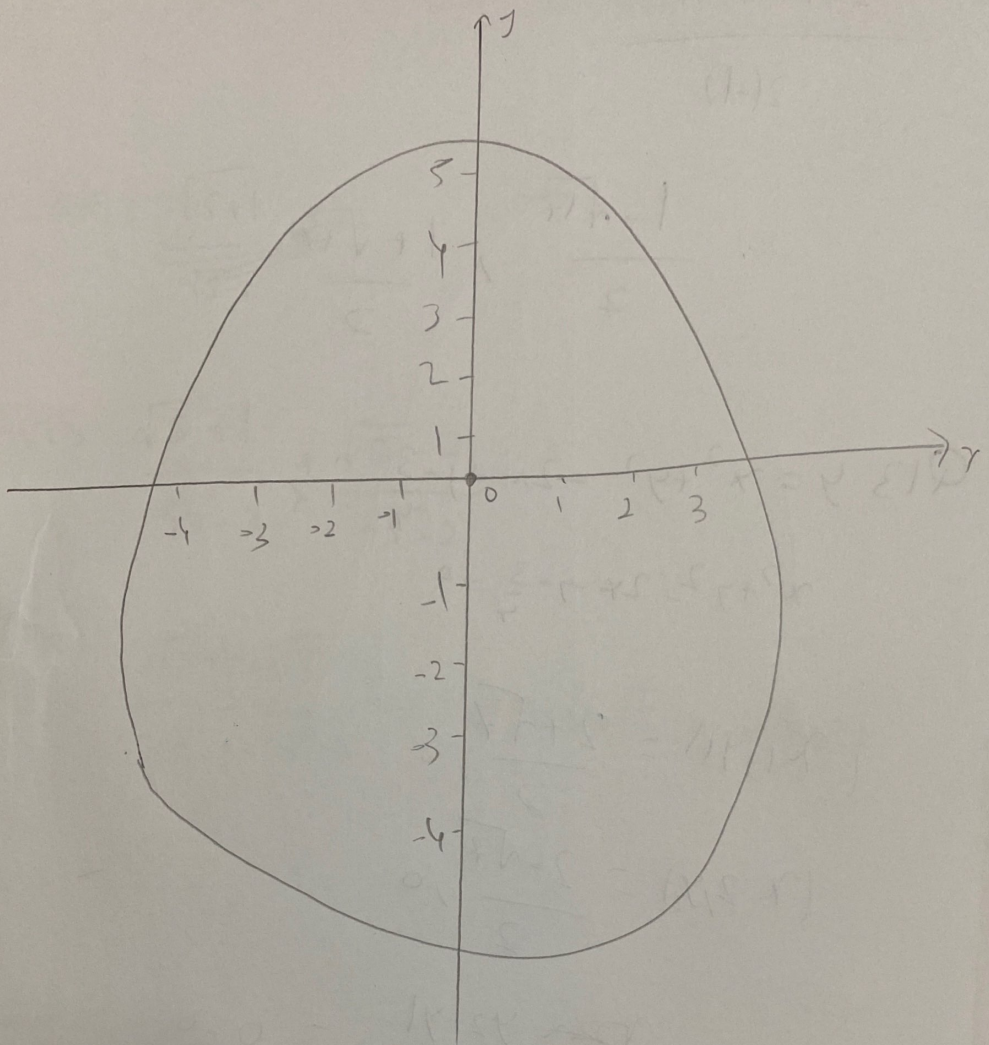
$$x^2 + y^2 - 2x - y - \frac{3}{4} = 0$$

$$(x_1, y_1) = \frac{2 + \sqrt{7}}{2}, 0$$

$$(x_2, y_2) = \frac{2 - \sqrt{7}}{2}, 0$$

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{0 - 0}{\frac{2 - \sqrt{7}}{2} - \frac{2 + \sqrt{7}}{2}}$$

$$= 0$$



~~Q(4) $f(x) = 2x^2 - 2x$~~

$$Q(4) f(x) = 2x^2 - 2x$$

$$f(2) = 2(2)^2 - 2(2) = 4$$

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

~~Q13~~ $\frac{\sqrt{5+1}}{\sqrt{5-2}}$

Q15 $\frac{\sqrt{5+1}}{\sqrt{5-2}} \times \frac{\sqrt{5-2}}{\sqrt{5-2}}$

$$\frac{\sqrt{5+1} \times \sqrt{5-2}}{(\sqrt{5-2}) \sqrt{5-2}} = -14 + 6\sqrt{5} = -0.5835$$