1) a) $5\sqrt{20} - 4\sqrt{75} + 2\sqrt{45}$

$5 \times \sqrt{4} \times \sqrt{5} - 4 \times \sqrt{25} \times \sqrt{3} + 2 \times \sqrt{9} \times \sqrt{5}$

$5 \times 2 \times \sqrt{5} - 4 \times 5 \times \sqrt{3} + 2 \times 3 \times \sqrt{5}$

$10\sqrt{5} - 20\sqrt{3} + 6\sqrt{5}$

$16\sqrt{5} - 20\sqrt{3}$

b) $\dfrac{2\sqrt{5}-1}{3-\sqrt{5}} + \dfrac{3+\sqrt{5}}{3+\sqrt{5}}$

$= \dfrac{6\sqrt{5}+10-3-\sqrt{5}}{9-5}$

$= \dfrac{5\sqrt{5}+7}{4}$

c) $\dfrac{x^3y^2 \times (2xy^2)^{-2}}{3\sqrt{x}}$

$\dfrac{x^3y^2 \times x^{-\frac{1}{2}}}{3 \times 4x^2y^4}$

$= \dfrac{x^{\frac{5}{2}}y^2}{12x^2y^4}$

$= \dfrac{x^{\frac{1}{2}}}{12y^2}$ or $\dfrac{\sqrt{x}}{12y^2}$

d) $3^{-x} = \dfrac{1}{243}$

$3^{-x} = \dfrac{1}{3^5}$

$3^{-x} = 3^{-5}$

$-x = -5$

$x = 5$

e) $\dfrac{x^3+8}{x^2+5x} \times \dfrac{x^2-25}{x^2-x-6}$

$\dfrac{(x+2)(x^2-2x+4)}{x(x+5)} \times \dfrac{(x-5)(x+5)}{(x-3)(x+2)}$

$= \dfrac{(x^2-2x+4)(x-5)}{x(x-3)}$

f) $\dfrac{1}{x} \div \dfrac{2}{x} + \dfrac{3}{2}$

$\dfrac{1}{x} \times \dfrac{x}{2} = \dfrac{1}{2}$

$\dfrac{1}{2} + \dfrac{3}{x}$

$= \dfrac{x+6}{2x}$

f) $10x^2 - 17x + 3 = 0$ $P: 30$ $S: -17$

$\frac{1}{10}(10x-15)(10x-2) = 0$

$\frac{1}{10}(5)(2x-3)(2)(5x-1) = 0$

$(2x-3)(5x-1) = 0$

$2x-3=0 \quad 5x-1=0$

$x = \frac{3}{2}$ and $\frac{1}{5}$

g) $x^2 - 2x - 4 = 0$

$x^2 - 2x = 4$

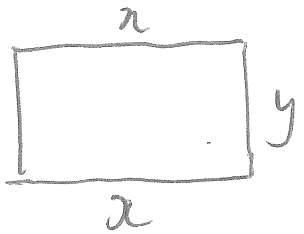
$x^2 - 2x + 1 = 4 + 1$

$(x-1)^2 = 5$

$x - 1 = \pm\sqrt{5}$

$x = 1 \pm \sqrt{5}$

h)



i) $2x + 2y = 32$

$2y = 32 - 2x$

$y = 16 - x$

ii) $A = x(16-x)$

$60 = 16x - x^2$

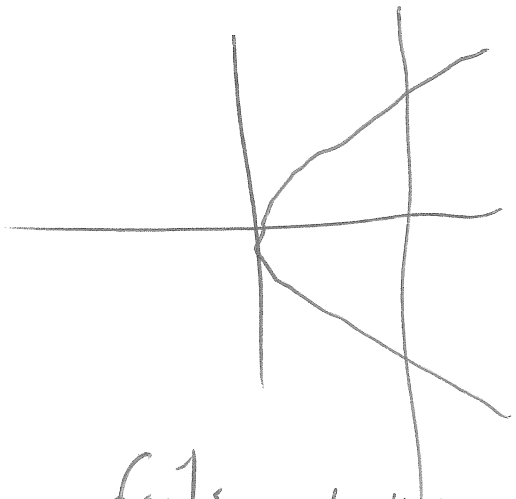
$x^2 - 16x + 60 = 0$

$(x-6)(x-10) = 0$

$x = 6$ or 10 $\quad y = 16-x$

$6 \times 10\text{m}$ or $10 \times 6\text{m}$

2) a)



fails vertical line test

∴ not a function - relation more than one 'y' value for each x value

b) $f(a) = 2a - 1 \quad g(x) = 10 - 3x + 5x^2$

i) $f(3) = 2(3) - 1$

$= 5$

ii) $g(-2) = 10 - 3(-2) + 5(-2)^2$

$= 16 + 20 = 36$

iii) $f(a) + g(a) = 2a - 1 + (10 - 3a) + 5a^2$

$= 5a^2 - a + 9$

c) i) $f(x) = \dfrac{4x^2}{x^2 - 1}$

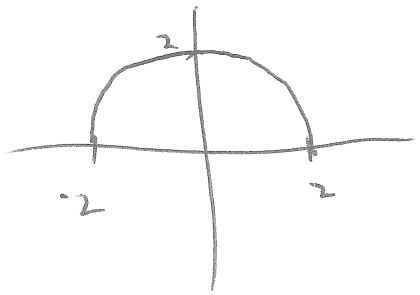
$f(-x) = \dfrac{4(-x)^2}{(-x)^2 - 1}$

$= \dfrac{4x^2}{x^2 - 1}$

∴ $f(-x) = f(x)$ ∴ even function

ii) symmetrical about the y axis.

2) d) $f(x) = \sqrt{4-x^2}$



$-2 \leq x \leq 2$

$0 \leq y \leq 2$

e) $|3x+1|$

$3x+1$ if $3x+1 \geqslant 0$

$3x \geqslant -1$

$x \geqslant -\frac{1}{3}$

$-3x-1$ if $3x+1 < 0$

$3x < -1$

$x < -\frac{1}{3}$

f) $y = |2x-4|$

$y = 2x-4$ if $2x-4 \geqslant 0$

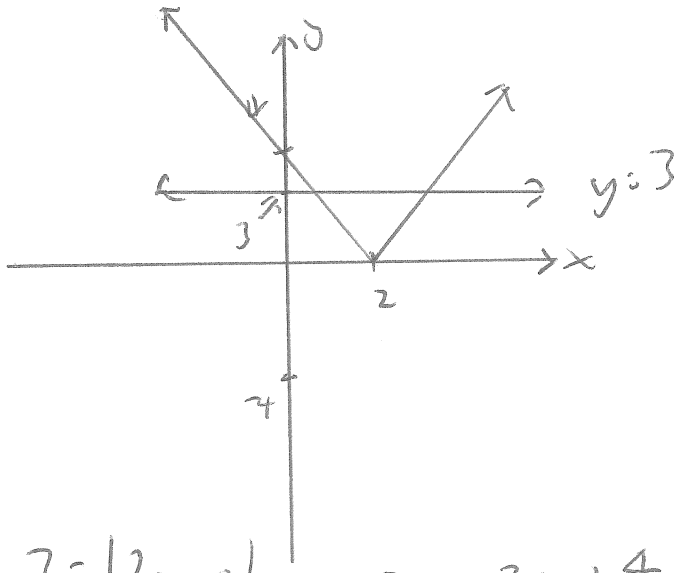
$2x \geqslant 4$

$x \geqslant 2$

$y = -2x+4$ if $2x-4 < 0$

$2x < 4$

$x < 2$



ii) $3 = |2x-4|$

$3 = 2x-4$

$7 = 2x$

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

$3 = -2x+4$

$-1 = -2x$

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

$\therefore x = \frac{7}{2}$ and $\frac{1}{2}$.

g) $x^2+4x+y^2-6y-3=0$

$x^2+4x+4+y^2-6y+9 = 3+4+9$

$(x+2)^2+(y-3)^2 = 16$

centre $(-2,3)$ radius $= 4$