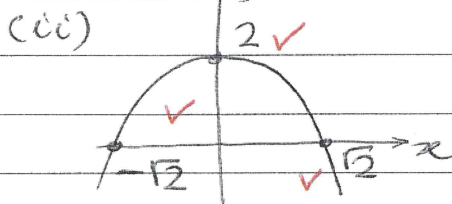
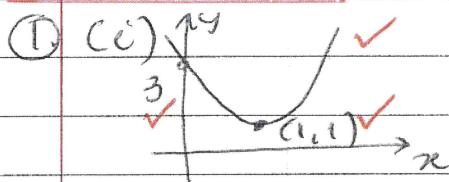


Pure 4 - Graphs, Solutions

Section 1:

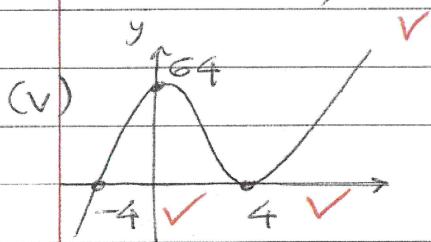
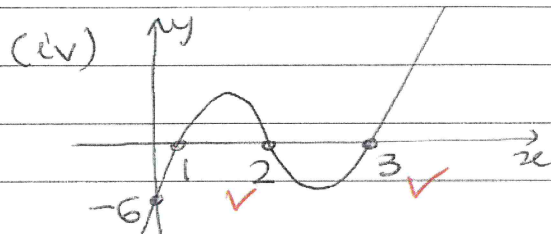
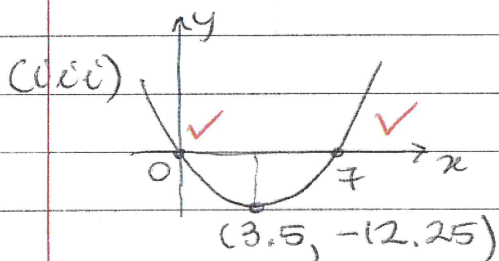
1. (a) $6\sqrt{3}$ (b) $7-4\sqrt{3}$
2. (a) 16 (b) $5x^{\frac{1}{3}}$
3. $(3, 1)^4$ $(-1, -3)$.

Section 2:

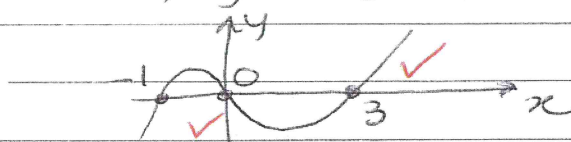


(i) - (iii) 3 marks

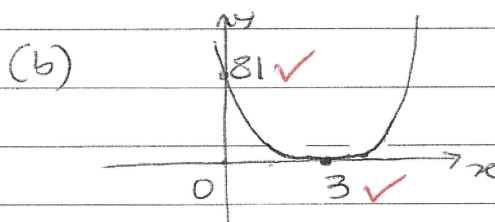
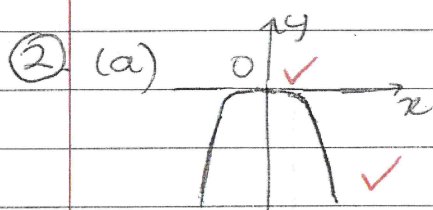
(iv) - (vi) 2 "



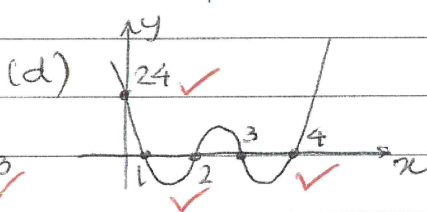
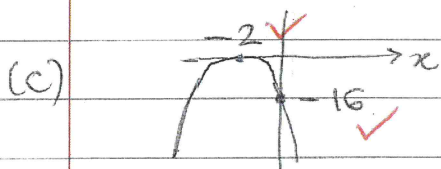
(vi) $y = x(x-3)(x+1)$



(15)

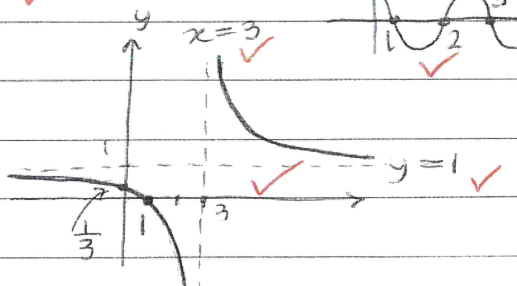


a, b, c
2 marks



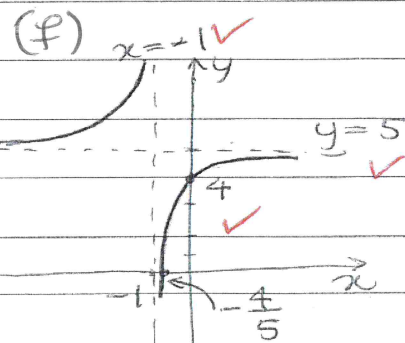
d-h
3 marks each.

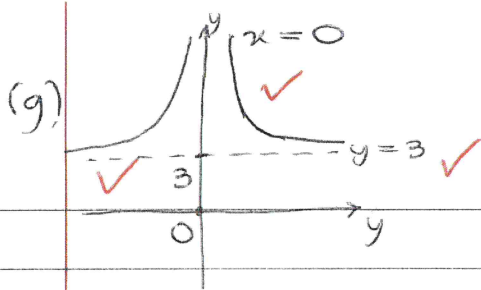
(e) $x=3$ $y=1$



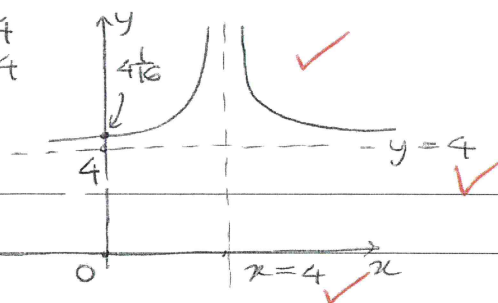
$y = -\frac{1}{x+1} + 5$

$x = -1$
 $y = 5$





(h) $x=4$
 $y=4$



(21)

③. $3x^2 - x - 4 = 0$ at A & C and $x=0$ at B.

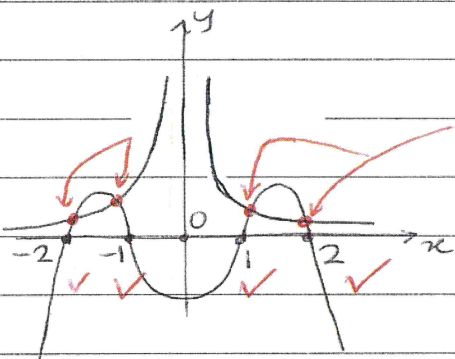
$(3x-4)(x+1) = 0$

$x = \frac{4}{3}$ or -1

A(-1, 0) B(0, -4) C($\frac{4}{3}$, 10)

(3)

④



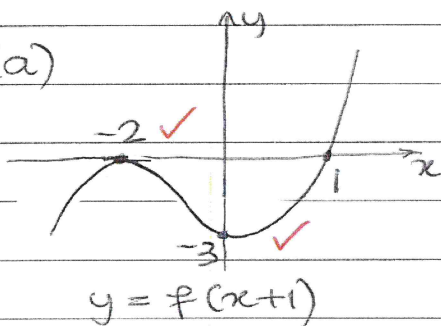
4 intersections = 4 solutions of:

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

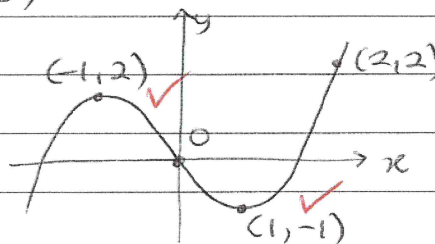
$x^2(x+1)(x+2)(x-1)(x-2) = -1$

//

⑤ (a)

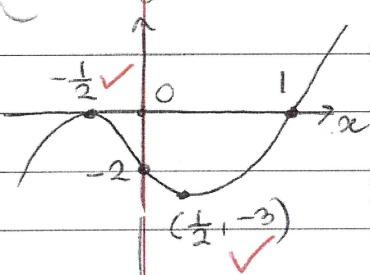


(b) $y = f(x+2)$

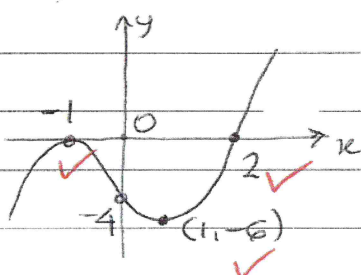


(5)

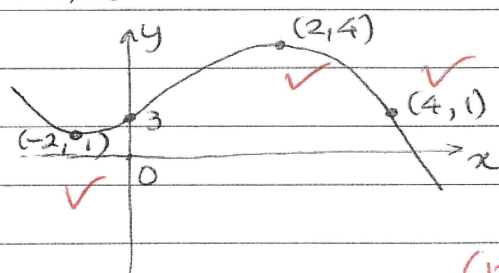
(c) $y = f(2x)$



(d) $y = 2f(x)$



(e) $y = 1 - f(0.5x)$



(12)

TOTAL! (56)

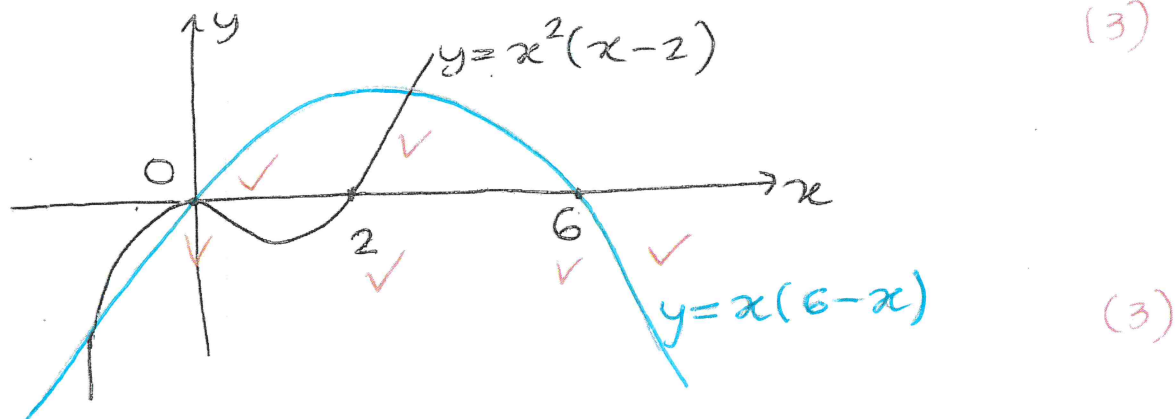
Section 3 →

PTO

Section 3:

① (a)

(i) $y = x^2(x-2)$ $x^2=0, x=0$ double root
 $x=2$
a cubic function:



(ii) $y = x(6-x)$ a quadratic function
 $x=0$ $6-x=0$
 $6=x, x=6$

(b) the graphs intersect where:

$$\begin{aligned} \left. \begin{aligned} y &= x^2(x-2) \\ y &= x(6-x) \end{aligned} \right\} \begin{aligned} x^2(x-2) &= x(6-x) \\ x^3 - 2x^2 &= 6x - x^2 \\ x^3 - x^2 - 6x &= 0 \quad \checkmark \\ x(x^2 - x - 6) &= 0 \end{aligned} \end{aligned}$$

\Rightarrow either $x=0$ or $(x^2-x-6)=0$

When $x=0$ $y=0^2(0-2)=0$

$(0, 0)$

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

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

$x=3$ $y=3^2(3-2)=9 \times 1=9$

$(3, 9)$

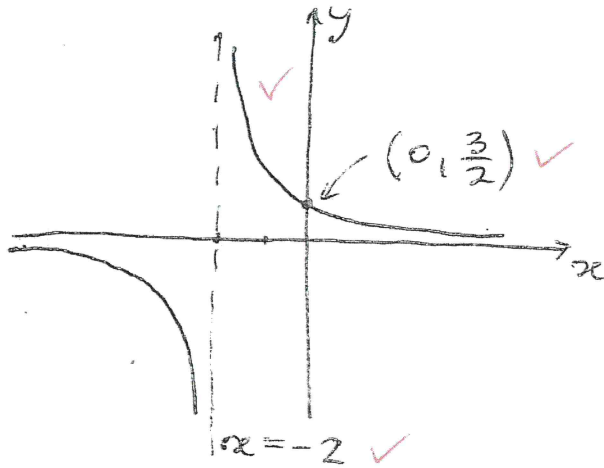
$x=-2$ $y=(-2)^2(-2-2)=4 \times -4=-16$

$(-2, -16)$

(7)

② $y = \frac{3}{x}$, $x \neq 0$

(a) $y = \frac{3}{x+2}$, $x \neq -2$



Crosses the y axis at
 $x=0$:

$$y = \frac{3}{0+2} = \frac{3}{2}$$

(3)

(b) asymptotes are $x = -2$, $y = 0$.

(2)