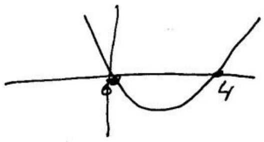
Ex 1.6

Q2 (i) $f(x) = x^2 - 4x$

$x(x-4) = 0$

$x = 0 \quad x = 4$

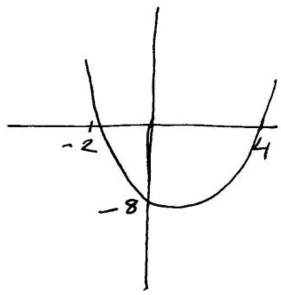


(ii) $x^2 - 2x - 8 = 0$

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

$x = 4 \quad x = -2$

cut y at -8



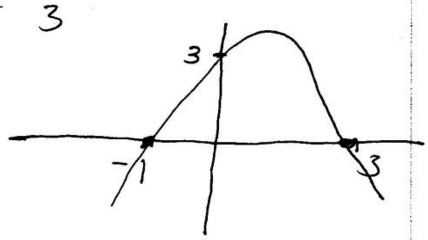
(iii) $f(x) = -x^2 + 2x + 3$

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

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

$x = 3 \quad x = -1$

cuts y at 3



Q3 (i) $x^2 - 4x + 2$

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

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

(ii) $x^2 - 12x + 36$

$= (x-6)^2$

(iii) $-x^2 + 8x - 12 = -[(x^2 - 8x + 16 - 16 + 12)]$

$-[(x-4)^2 - 4]$

$= -(x-4)^2 + 4$

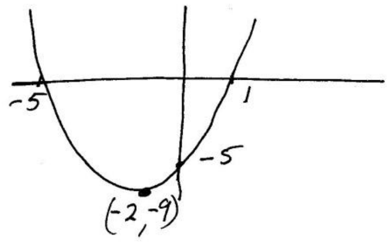
Q5 $\quad y = x^2 + 4x - 5 \qquad$ cuts y at $\underline{\underline{-5}}$

$0 = (x+5)(x-1)$

$\underline{\underline{x = -5}} \quad \underline{\underline{x = 1}}$

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

$(x+2)^2 - 9 \quad \Rightarrow$ Turning pt at $(-2, -9)$



Q7 $\quad y = ax^2 + c$

$(-1, 4) \quad 4 = a(-1)^2 + c$

$4 = a + c$

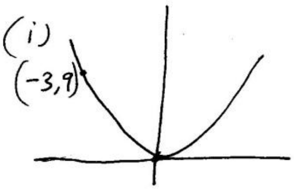
$4 = a + 8$

$\underline{\underline{-4 = a}}$

$(0, 8) \quad 8 = a(0)^2 + c$

$\underline{\underline{8 = c}}$

Q8 (i)



$y = x^2$ from observation.

$\boxed{\text{or}}$ $\quad y = \cancel{ax^2 + bx + c}$

$(-3, 9) \quad \cancel{9 = a(-3)^2 + b(-3) + 0}$ ← cuts y at 0

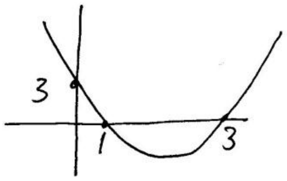
$\cancel{9 = 9a - 3b} \quad \cancel{(\div 6)}$

$\cancel{3 = 3a - b}$

$(0, 0) \quad \cancel{0 = a(0)^2 + b(0) + c}$

$\cancel{c = 0}$

Q8 (ii)



$x = 1 \qquad x = 3$

$(x-1)(x-3)$

$f(x) = a(x-1)(x-3)$

$(0,3): \quad 3 = a(0-1)(0-3)$

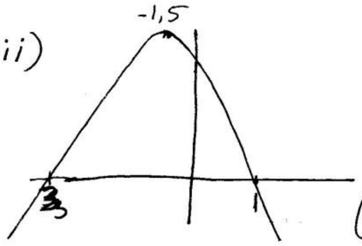
$3 = 3a$

$1 = a$

$\Rightarrow f(x) = 1(x-1)(x-3)$

$= x^2 - 4x + 3.$

Q8 (iii)



$x = -3 \qquad x = 1$

$f(x) = a(x+3)(x-1)$

$(-1,5): 5 = a(-1+3)(-1-1)$

$5 = a(2)(-2)$

$5 = -4a$

$-5/4 = a$

$\Rightarrow f(x) = -5/4\,(x+3)(x-1)$

Q12 (a) $y = (x+1)(x+2)(x-3)$ cuts x at $y=0$

$\therefore \; 0 = (x+1)(x+2)(x-3)$

$x = -1 \quad x = -2 \quad x = 3.$

cuts y at $x=0$.

$y = (0+1)(0+2)(0-3)$

$y = (1)(2)(-3)$

$y = -6$

(b) $y = x(x-6)(x+3)$

$x = 0 \quad x = 6 \quad x = -3$ cuts x

$y = 0(0-6)(0+3)$

$y = 0$ cuts y.

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

$x = 1 \quad x = -2 \rightarrow$ (Turning pt.)

$y = (0-1)(0+2)^2$

$y = (-1)(4)$

$y = -4$

(d) $y = x(x^2-9)$

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

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

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

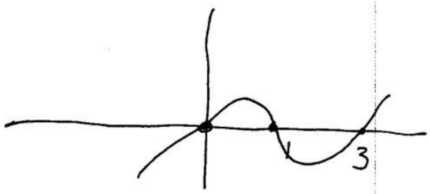
$y = 0.$

Q13 (i) $y = x(x-1)(x-3)$

$x=0 \quad x=1 \quad x=3$

$y = 0(0-1)(0-3)$

$y=0$



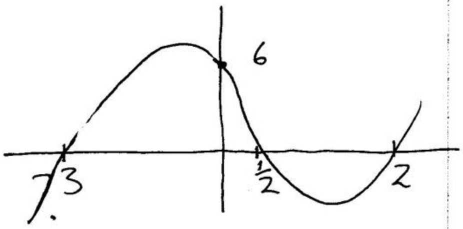
(ii) $y = (x-2)(x+3)(2x-1)$

$x=2 \quad x=-3 \quad x=1/2$

$y = (0-2)(0+3)(2(0)-1)$

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

$y = 6.$



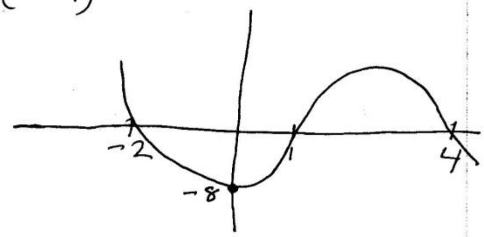
(iii) $y = -(x-1)(x+2)(x-4)$

$x=1 \quad x=-2 \quad x=4$

$y = -(0-1)(0+2)(0-4)$

$y = -(-1)(2)(-4)$

$y = -8$



(iv)

$y = x^3 - 9x$

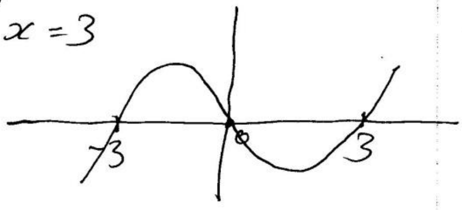
$= x(x^2-9)$

$x(x+3)(x-3)$

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

$y = (0)^3 - 9(0)$

$y=0$



Q14 (i) Co-eff is neg in graph B

(ii) One real root in graph C

(iii) Pos and ↓ $1 < x < 2.4$ B

(iv) neg and ↓ $x > 2.4$ B

Q15

$y = x^3 - x^2 \Rightarrow$ C

$y = 1 - x^2 \Rightarrow$ A

$y = x - x^2 \Rightarrow$ B

$y = -\frac{3}{4}x + 3 \Rightarrow$ F

$y = x^2 + 3x \Rightarrow$ E

$y = 9x - x^3 \Rightarrow$ D

Q16

(i) $f(3) = -27$

(ii) Max Turning pt is $(-1, 5)$

(iii) $x = -2.8$, $x = 1.8$, $x = 4$

(iv) Decreasing $-1 < x < 3$

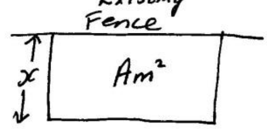
(v) $f(x) = 10$ is linear $y = 10$ and cuts graph only once

(vi) $f(x) = -10$ line $y = -10$ cuts graph at 3 points

(vii) $f(x) = k$ 3 roots

$\Rightarrow -27 < k < 5$

Q19



60 m of fencing
$\Rightarrow$ length $= (60-2x)$

(i) $A = (x)(60-2x)$

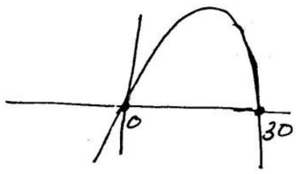
$\Rightarrow$ $A = 60x - 2x^2$

(ii) $A = (x)(60-2x)$

$x=0 \quad x = 30$ cuts x axis. $(0,0)$ $(30,0)$

$A = (0)(60-2(0))$

$A = 0$ cuts A at 0



(iii) Max Area occurs at $x = 15$

$A = 60(15) - 2(15)^2$

$A = 450 \text{ m}^2$