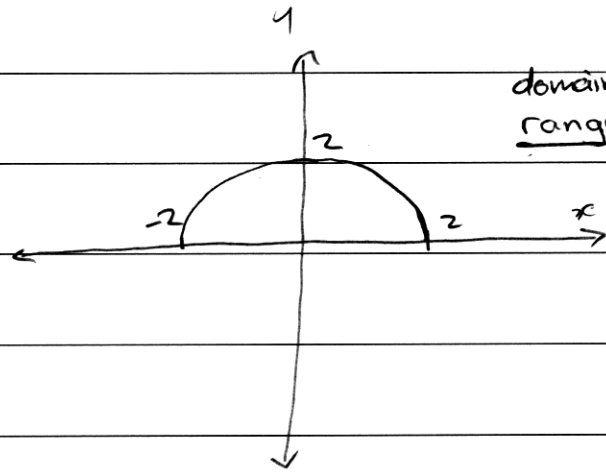
BOARD OF STUDIES
NEW SOUTH WALES

Question (6)

a)



domain: $-2 \leq x \leq 2$
range: $0 \leq y \leq 2$

b) $f'(x) = 3(x+1)(x-3)$

$f'(x) = 3x^2 - 6x - 9$

$f(x) = x^3 - 3x^2 - 9x + C$

$f''(x) = 6x - 6$

$0 = 6x - 6$

$\therefore 6(x-1) = 0$

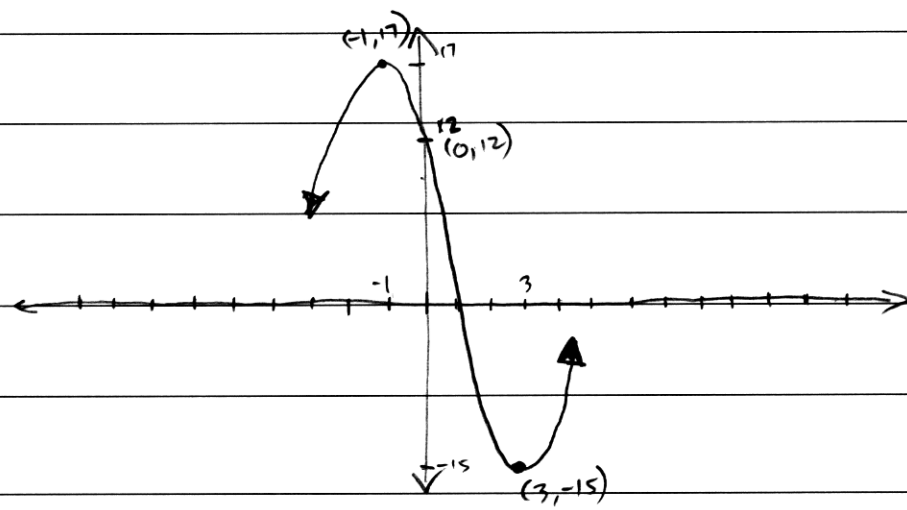
$\therefore x = 1$

i) $f(x)$ passes through $(0, 12)$

$\therefore 12 = C$

$\therefore f(x) = x^3 - 3x^2 - 9x + 12$

ii)



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b) iii) curve is concave up when $x > 1$

c) $y = \left[\frac{x^4}{4}\right]_0^2$

$\therefore A = 4 \text{ unit}^2$

$V = \pi 4^2$

$= 50.265 \quad (3dp)$