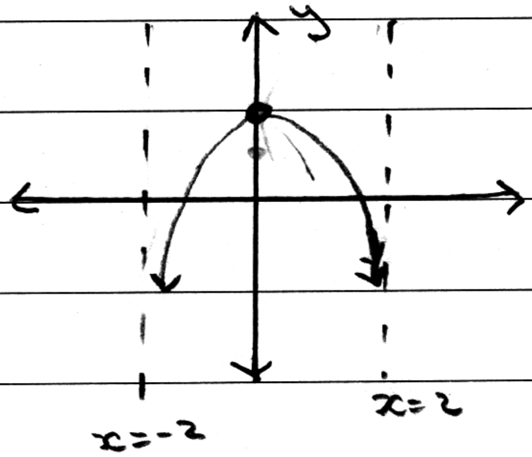
Question 6.

a)



$y = \sqrt{4-x^2}$

$x \neq \pm 2.$

when $x=0$
$y=2$

$x\ 0$

b)

i). equation of the curve.

$\int f'(x)\ dx.$

when $f'(x) = 3(x-1)(x-3)$

$= 3(x^2 - 4x + 3)$

$= 3x^2 - 12x + 9$

$= \int 3x^2 - 12x + 9.\ dx$

$= \frac{3x^3}{3} - \frac{12x^2}{2} + 9x + C.$

$= x^3 - 6x^2 + 9x + C$

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when $x=0$ $y=12$.

$\therefore$ $f(x)= x^3 + 6x^2 + 9x + C$

when $x=0$ $y=12$

$12 = 0^3 + 60^2 + 90 + C$

$12 = C$

$\therefore$ $c=12$.

$f(x) = x^3 + 6x^2 + 9x + 12$.

ii). $f'(x) = 3(x-1)(x-3)$

sationary points are when $f'(x) = 0$.

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

$x=1$ $x=3$.

when $x=1$ $x=3$

$y=16$. $y = 27 + 54 + 54 + 12$

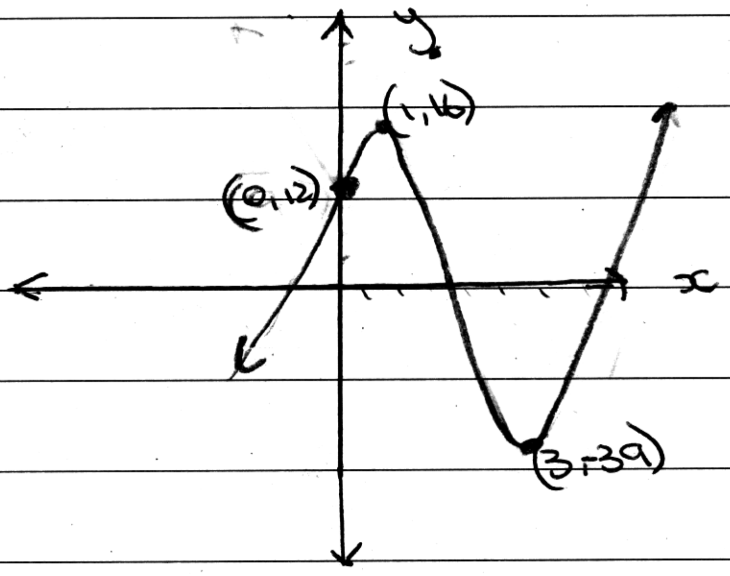
$= 39$.

$f'(x) = 3x^2 - 12x + 9$.

$f''(x) = 6x - 12$.

when $x = 1$ x $x=3$

$f''(x) = -6$ max truning pont $f''(x) = 6$ min truning point



iii). $x \geq 3$.

c)

$V = \pi \int_a^b x^2 \, dy$

$y = \frac{x^4}{4}$. $\qquad V = \pi \int_0^4 2y \, dy$

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

$2y = x^2$.

$= \pi \left[y^2 \right]_0^4$

when $x = 0$

$y = \frac{2^4}{4}$ $\qquad = \pi \left[4^2 - 0^2 \right]$

$= \frac{16}{4}$ $\qquad = 16\pi$ units^3 #

$= 4$.