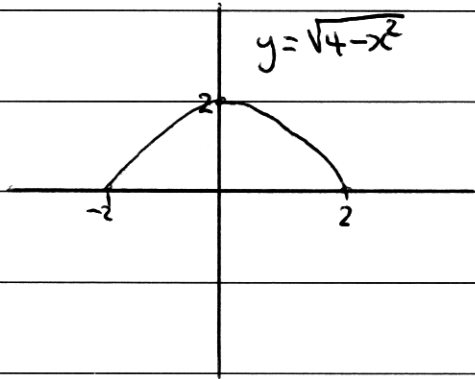


Question 6

a)



range = ~~all real~~ all real y

i)

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

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

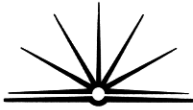
$$f(x) = \frac{1}{2}(x+1)^2(x-3)$$

$$y = \frac{1}{2}(x+1)^2(x-3)$$

ii) turning points occur when $\frac{dy}{dx} = 0$

to find y intercept let $x = 0$

iii) curve is concave up when the second derivative is > 0 .



$$c) \int_a^b \pi y^2 dx \quad y = \frac{x^4}{4} \quad x=0 \quad x=2$$

~~$$\pi \int_0^2 \left(\frac{x^4}{4}\right)^2 dx$$~~

~~$$\pi \int_0^2 \frac{x^8}{16} dx$$~~

~~$$\pi \int_0^2 \frac{x^8}{16} dx$$~~

$$\pi \int_0^2 \frac{x^8}{16} dx = \pi \left[\frac{x^9}{144} \right]_0^2$$

$$= \pi \left(\frac{2^9}{144} \right) - \left(\frac{2^0}{144} \right)$$

$$= \pi \left(\frac{32}{9} \right) - \left(\frac{1}{144} \right)$$

$$= \pi \frac{511}{144}$$

$$= 11.15 \text{ units}^3 \quad \text{to 2 dec places}$$

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

$$3(x+1)^2$$

$$1\frac{1}{2}(x+1)^2 \times (x-3)$$

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

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

$$1\frac{1}{2}x^2 + 3\frac{1}{2}x + 1\frac{1}{2}$$

$$(x+1)(x+1) \quad x^2 + x + x + 1$$

$$x^2 + 2x + 1$$