Start here for Question Number: 6

a)

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

(i) Stationary points, $f'(x) = 0$

$$f(x) = x^3 + 4x + 2x^2 + 8$$
$$= x^3 + 2x^2 + 4x + 8$$

$$f'(x) = 3x^2 + 4x + 4$$

$f'(x) = 0$

$$3x^2 + 4x + 4 = 0$$

$p = 12$
$s = 4$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-4 \pm \sqrt{4^2 - 4.3.4}}{6}$$

$$= \frac{-4 \pm \sqrt{-32}}{6} \qquad \Delta < 0$$

no soln^{s} $\therefore f'(x) \neq 0$ ie

$\therefore$ no stationary points.

(ii) concave down when $f''(x) < 0$

$f''(x) = 6x + 4$

$6x + 4 < 0$

$6x < -4$

$x < \frac{-4}{6}$

$x < \frac{-2}{3}$.

$6x + 4 = 0$

$6x = -4$

$x = \frac{-4}{6}$

concave up when $f''(x) > 0$

$6x + 4 > 0$

$6x > -4$

$x > \frac{-4}{6}$

$x > \frac{-2}{3}$

∴ concave down $x < \frac{-2}{3}$, concave up $x > \frac{-2}{3}$.

4 PTO

x int, $y = 0$

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

$x = -2$ $\quad x^2 + 4 = 0$

$x^2 = -4$

$x = \sqrt{-4}$

no soln

∴ $x = -2$.

y int, $x = 0$

$= 8$.

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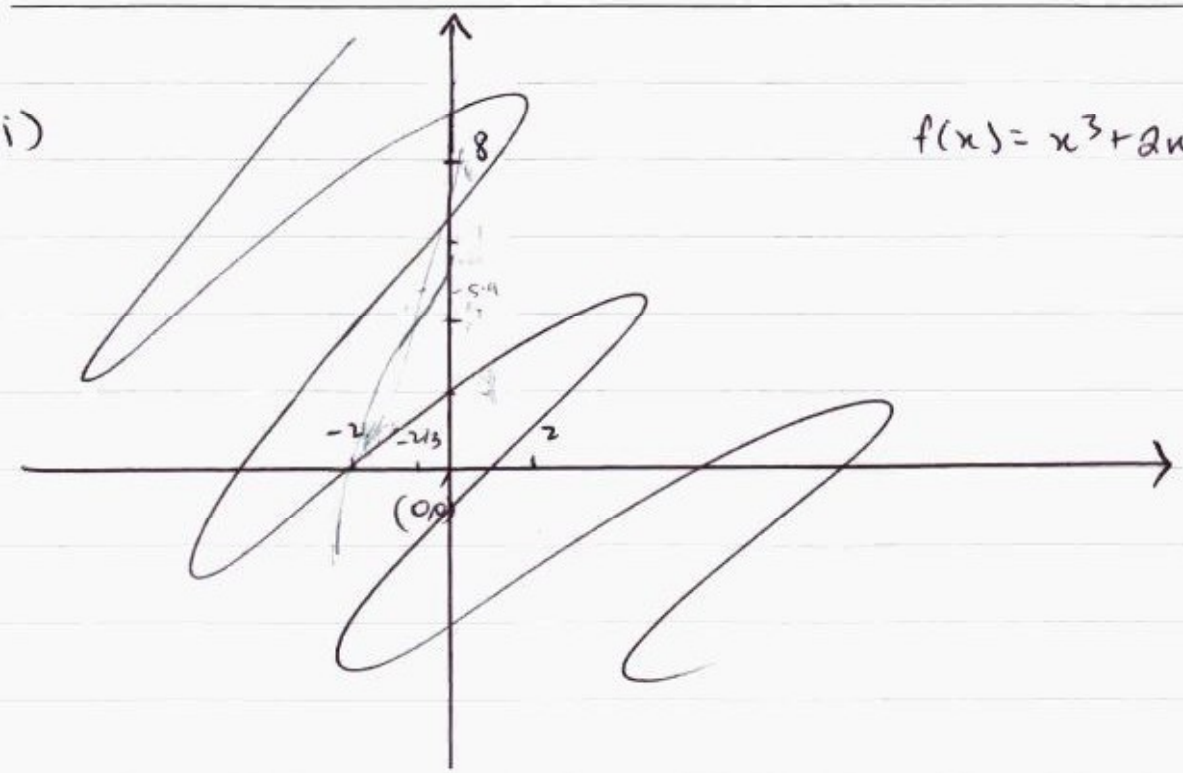
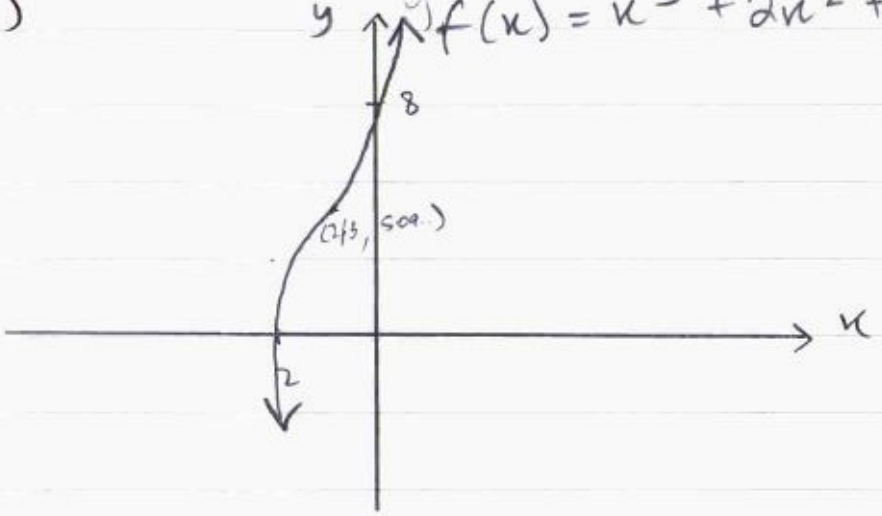
(iii)

$f(x) = x^3 + 2x^2 + 4x + 8$



(iii)

$f(x) = x^3 + 2x^2 + 4x + 8$



b) (i) $\angle POQ$.

$l = r\theta$

$9 = 5 \cdot \theta$

$\theta = \frac{9}{5}$

$= 1.8^c$

You may ask for an extra Writing Booklet if you need more space to answer question 6.

Start here. Q6

b)

(ii) In $\triangle OPT$ and $\triangle OQT$:

K: $O\hat{P}T = O\hat{Q}T$ (given)

H: OT common

S: OP = OQ (equal radii)

$\therefore \triangle OPT \equiv \triangle OQT$ (RHS test).

(iii) PT = 5cm (matching side congruent $\triangle$s)

(iv) $A_{shaded} = A_{KITE} - A_{SECTOR}$

$A_{KITE} = \frac{1}{2}xy$

$= \frac{1}{2} \cdot 5 \cdot 12$

$= 30 \text{ m}^2$

let $y = PT = 12$

$A_{sector} = \frac{1}{2}r^2\theta$

$= \frac{1}{2} \cdot 5^2 \cdot 1.8$

$= 22.5$

$\therefore A_{shaded} = 30 - 22.5$

$= 7.5 \text{ m}^2$.

(iii) $\tan 0.9 = \frac{PT}{S}$

$\therefore PT = S \tan 0.9$

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