Start here for Question Number: 6

a.i. $f(x) = (x+2)(x^2+4)$ (u, v)

$f'(x) = u'v + v'u$

$= x(2x) +$

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

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

sub $f'(x) = 0$

$0 = x^3 + 2x^2 + 8x$

$0 = x(x^2 + 2x + 8)$

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

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

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

$= 3x^2 - 6x + 2x + 4x$

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

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

~~no stationary point~~

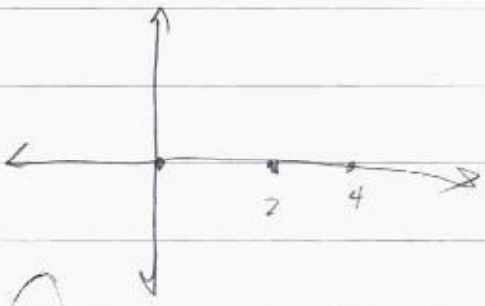
$-4 = 3x^2 + 4x$

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

$\therefore$ no stationary points.

ii. $y = f(x)$

=



$y'' = 6x + 4$

$0 \leq 6x + 4 \geq 0$

$6x \geq -4$

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

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

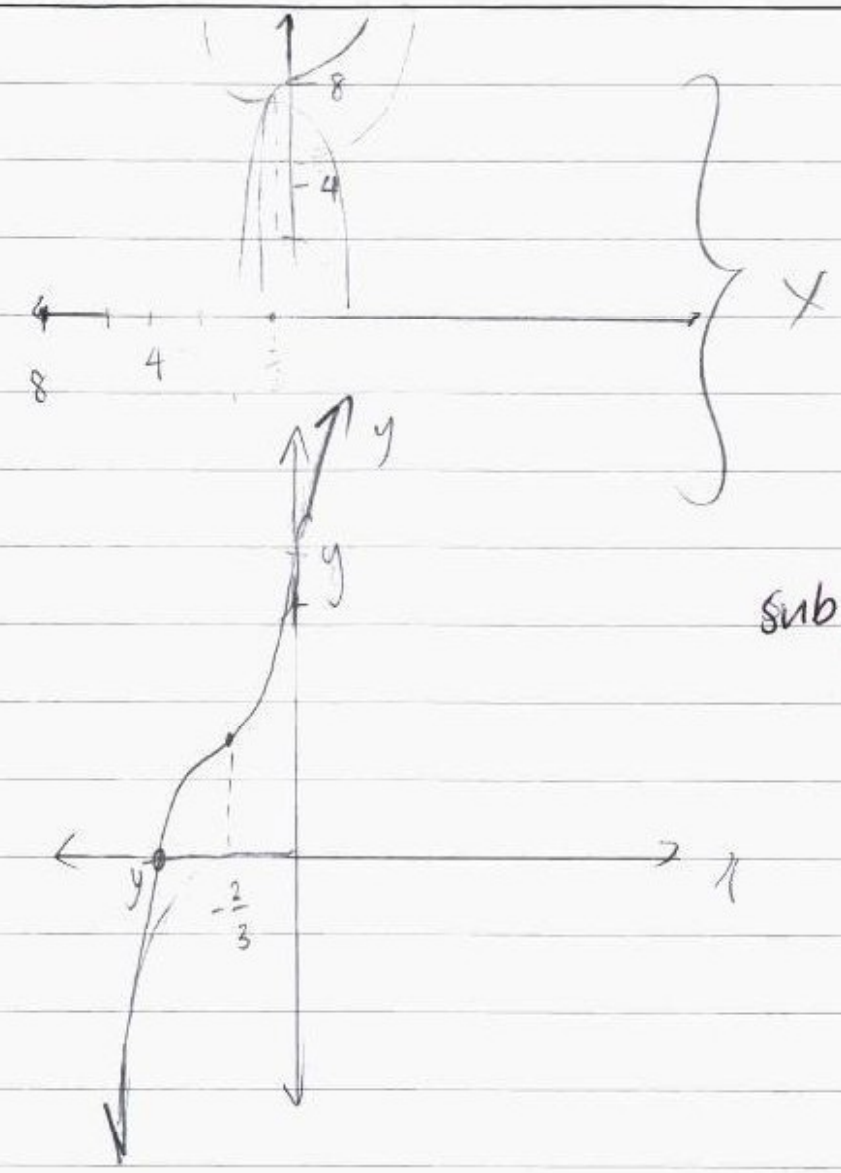
graph is concave down

$y'' = 6x + 4$

$6x \leq -4$

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

$x < \frac{-2}{3}$ graph is concave up



sub $y = 0$

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

$0 = x^3+4x+2x^2+8$

$=$

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b. i. $l = \theta r$

$q = \theta \times 5$

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

$= 102°7'$ $= \frac{9\pi}{900} = \frac{\pi}{100}$ radians.

$\theta = 103.132$ radians

ii.

In $\triangle OPT$ & $\triangle OQT$

- OT is shared / common
- $\angle OPT = \angle OQT = 90$ (given)
- $OP = OQ = 5cm$ (given)

$\triangle OPT \equiv \triangle OQT$ (SAS)

iii. length $PT =$

(matching sides congruent triangles)

iv. area of sector $= \frac{1}{2} r^2 \theta$

$= \frac{1}{2} \times 25 \times \frac{\pi}{100}$

$= 0.392699$

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