

Start here for

Question Number:

6

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

i) Show graph $y=f(x)$ has no stat points.

Stat points when $y'=0$

$$\therefore y' = vu' + uv'$$

$$u = x+2$$

$$y' = x^2+4 \times 1 + x+2 \times 2x$$

$$u' = 1$$

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

$$v = x^2+4$$

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

$$v' = 2x$$

$$\left(\frac{3x}{3} \right) \left(\frac{3x}{3} \right)$$

ii) Find values for concave down and concave up of $y=f(x)$

Concave up when $x > 0$

concave down when $x < 0$

iii) sketch

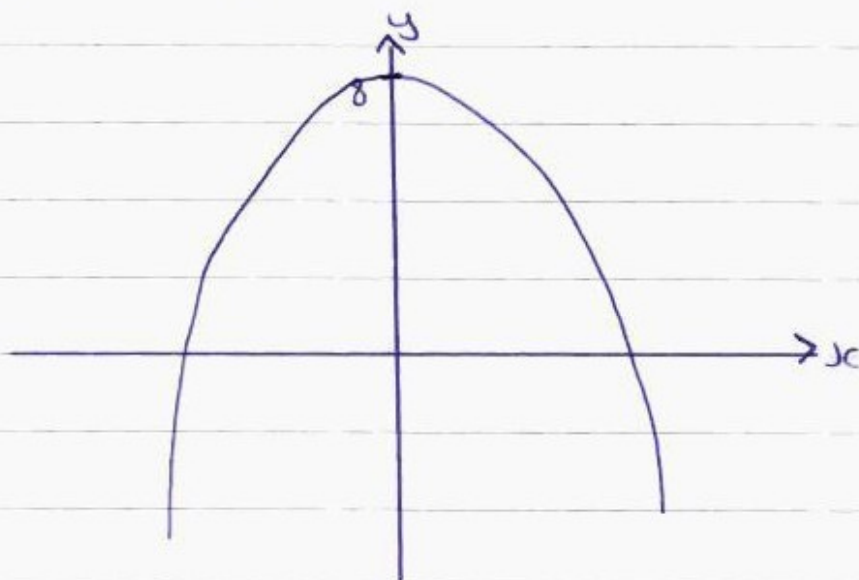
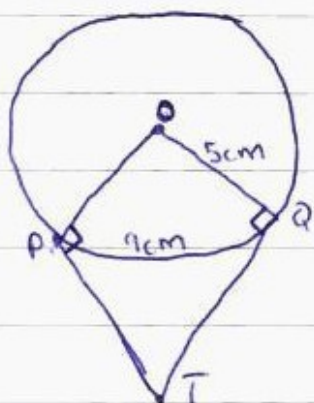
x values when $y=0$

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

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

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

$$y = (0+2) \times (0^2+4) \\ = 8$$

b) $r=5\text{cm}$ i) Find $\angle POQ$ in radians.

$$\angle POQ = 180 - 45 - 45 \\ = 90^\circ$$

$$\text{in radians: } \frac{\pi}{2}$$

Additional writing space on back page.

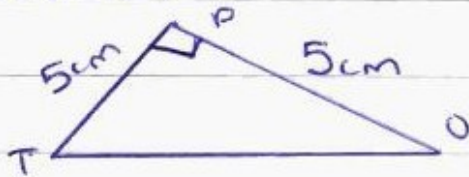
ii) Prove $\triangle OPT$ is congruent to $\triangle OQT$

$\angle OPT = \angle OQT$ given right angle.

$PO = QO = 5\text{cm}$ given \therefore same side

$PT = QT$ Perpendicular meeting at point T \therefore side
 $\therefore \cong$ RHS

iii) Find PT



$$OT^2 = 5^2 + 5^2$$

$$= 25 + 25$$

$$= 50$$

$$OT = \sqrt{50}$$

Ans

iv) Find the area of shaded region.

$$\text{area of sector} = \frac{1}{2} r^2 (\theta)$$

$$= \frac{1}{2} 5^2 \left(\frac{90}{180} \right)$$

$$= \frac{25}{2} \left(\frac{\pi}{2} \right)$$

$$= \frac{25\pi}{4}$$

