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u v

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

i) $f'(x) = u = x+2 \quad v = x^2+4$

$u' = 1 \quad v' = 2x$

$vu' + uv'$

~~$= 2x(1) + x+2+$~~

$= x^2+4(1) + x+2(2x)$

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

$= x^2 + 5x + 4 \quad \times 4$

$= (x+4)(x+1) \quad +5$

for Stat pts $y' = 0 \quad f'(x)(x+4)(x+1) = 0$

$x = (-4, -1)$

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

~~$x^3 + 4x + 2x^2 + 8$~~

ii) Concave down $\Rightarrow x < 0$

to determine nature $y'' = 0$

$y'' = 2x + 5 = 0$

~~Max (concave down)~~

when $x = -4$

$y'' = 2(-4) + 5$

$= -8 + 5$

$= -3$

Maximum for $x = -4$

since $-3 < 0$ ∴ concave down.

when $x = -1$

$y'' = 2(-1) + 5$

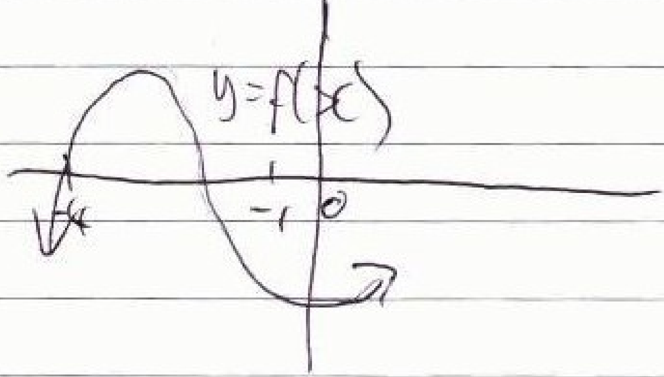
$= -2 + 5$

$= 3$ Minimum (concave up)

for $x = -1$

since $3 > 0$

(ii)



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

$(x+2)(x^4+8x+16)$

$= x(x^4+8x+16)+2(x^4+8x+16)$

$\cancel{= x^5+8x^2+16x+x^5+8x^2+...}$

$\cancel{= x^5+8x^2+16x+2x^4+16x+32}$

$\cancel{= x^5+8x^2}$

b) $r = 5cm$ $L = 9cm$

i) $\angle POQ$ $l = r\theta$

$9 = 5\theta$

$\theta = \frac{9\pi}{5}$ radians $= 324°$

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

$\triangle OPT \equiv \triangle OQT$

(opposite angles are equal)

(opposite sides bisect at right angles)

(share common angle O) (Given)

(Radius constant $\therefore$ same sides PO and OQ

Therefore congruent. (~~equal~~ equi-angular)

iii) $PT = 8cm$.

iv) $A = \frac{1}{2}r^2\theta = \frac{1}{2} \times 5^2 \times \frac{9\pi}{5} = 112\frac{1}{2}\frac{\pi}{5} = 22\frac{1}{2}\pi$ units

Additional writing space on back page.