Question 6

2010 HSC Mathematics

Question 6	2010 HSC ₁ Mathematics	Band 1/2 Sample 2
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ai) $f(x) =$	$(3c+2)(3c^2+4)$	
	$x^{3} + 4x + 2x^{2} + 8$	
f'(x) =	$3x^{2} + 4 + 4x$	
stpls. y'= c) -	
0	$= 3x^2 + 4x + 4$	
0-	= { $\chi^{2}+6x+2x+12$	
	= x(x+6) + 2(x+6)	
	= (3c+6)(x+2)	
	. no stationary points.	
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(i) Max/Min y	"=0	
y'= 3x2 + 4	++ 4x	
y'' = 6x + 0	4	
0 = 6x + 4		
6x = -4		
>c= -2 3	·: <0 .: max have million.	
	//	
	$(at x = \frac{1}{3})$	
$0 = 6 \times (\frac{1}{3}) +$		
	. Jo min.	
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	con	4-0

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(iii) sub $:=-\frac{2}{3}$: sub at x = = = $y = x^{3} + 4x + 2x^{2} + 8$ = $(\frac{1}{3})^{3} + 4x \frac{1}{3} + 2x(\frac{1}{3})^{2} + 8$ $y = x^{3} + 4x + 2x^{2} + 8$ = $\left(\frac{2}{3}\right)^{3} + 4x - \frac{2}{3} + 2x \left(-\frac{2}{3}\right)^{2} + 8$ - y= 9 16 or 9.59 : y= 525 or 5.9. randelup= 10 . $(\frac{1}{2}, 9\frac{16}{27})$ 1 (-2 15 25) -12 b)i)o = rl $= \frac{9x5}{150}$ $\therefore = \frac{1}{4}$ ii) In A'S OPT and ORT, PO 1200 = 00 (radius = Som) COPT = COQT (90°, given) (OTP = (OTQ (peperdicular from Pand Q). · . <u>A OPT is congruent to DOQT</u>. Additional v Office Use Only - Do NOT write anything or make any marks below this line Additional writing space on back page.

(ii) PT = Pythog theorem $<math>b^2 = b^2 c^2 + -a^2$? $5^2 = c^2 - a^2$ $a_2 = c^2 - a^2$ $\frac{1}{2} \left(\frac{1}{2} + \frac{1}{2} \right)^{2} \left(\frac{1}{2} + \frac{1}{2} \right)^{2} \left(\frac{1}{4} - \frac{1}{4} \right)^{2}$ $= \frac{1}{2} \times 5^{2} \left(\frac{1}{4} - \frac{1}{4} \right)^{2}$ = 0.978642... = 0.9786 (4dp) You may ask for an extra Writing Booklet if you need more space to answer question 6.