

JAN 2013

Core 1

① i) 
$$x = \frac{6 \pm \sqrt{36 - 4(-2)}}{2}$$

$$= \frac{6 \pm \sqrt{44}}{2} = \underline{3 \pm \sqrt{11}}$$

ii) 
$$\frac{dy}{dx} = 2x - 6$$

②  $x = -5$  
$$\frac{dy}{dx} = -10 - 6$$

$$= \underline{-16}$$

② i)  $3^n = 1$   $\underline{n = 0}$

ii)  $t^{-3} = 64$   ~~$t = 64$~~   ~~$t = \frac{1}{64}$~~   $\underline{t = \frac{1}{4}}$

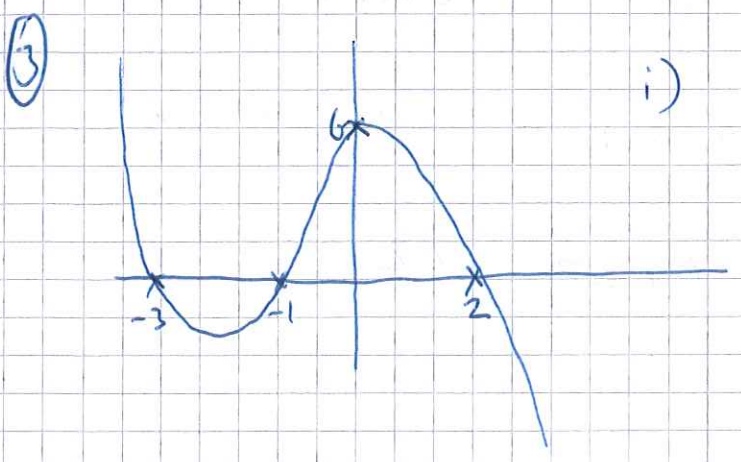
iii)  $(8p^6)^{1/3} = 8$ 

$$\sqrt[3]{8p^6} = 8$$

$$2p^2 = 8$$

$$p^2 = 4$$

$$\underline{p = 2}$$



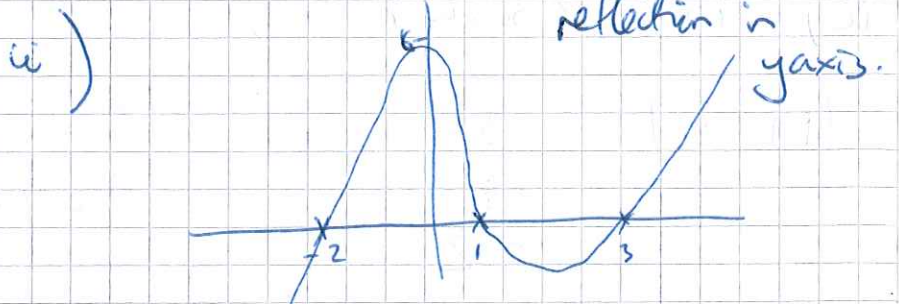
ii) 
$$y = (-x^2 + x + 2)(3 + x)$$

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

$$\quad -3x^2 + 3x + 6$$


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$$= -x^3 - 2x^2 + 5x + 6$$



$$\textcircled{7} \text{ i) } y = \frac{(3x)^2 \times x^4}{x}$$

$$= 9x^2 \times x^4 \times x^{-1}$$

$$= 9x^5$$

$$\frac{dy}{dx} = 45x^4$$

$$\text{ii) } y = \sqrt[3]{x}$$

$$y = x^{1/3}$$

$$\frac{dy}{dx} = \frac{1}{3} x^{-2/3}$$

$$\text{iii) } y = \frac{1}{2x^3}$$

$$y = (2x^3)^{-1}$$

$$y = \frac{1}{2} x^{-3}$$

$$\frac{dy}{dx} = -\frac{3}{2} x^{-4}$$

$$\textcircled{8} \quad hx^2 + (3k-1)x - 4$$

$$b^2 - 4ac < 0$$

$$(3k-1)^2 - 4(h)(-4) < 0$$

$$9k^2 - 6k + 1 + 16k < 0$$

$$9k^2 + 10k + 1 < 0$$

$$k = \frac{-10 \pm \sqrt{100 - 4(9)}}{18}$$

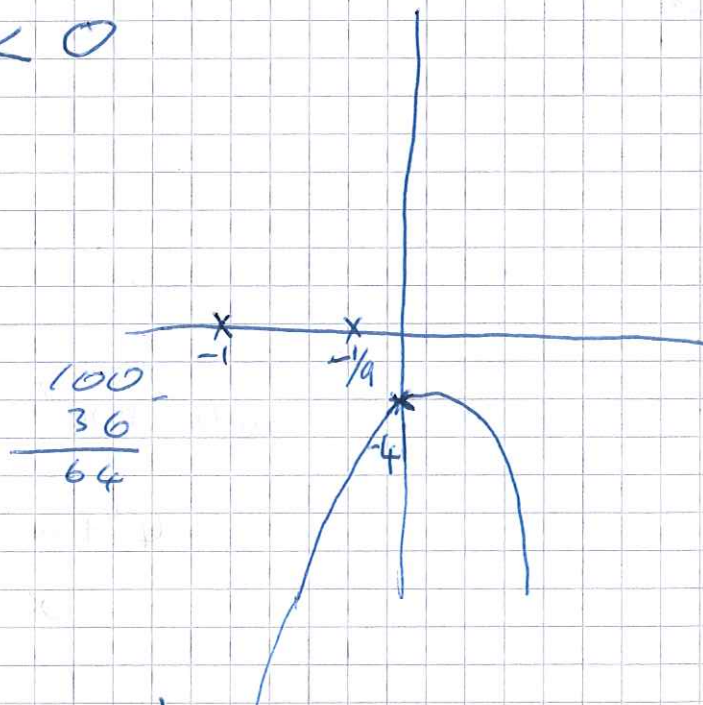
$$k = \frac{-10 \pm 8}{18}$$

$$= \frac{-5 \pm 4}{9}$$

$$k = \frac{-9}{9} = -1$$

$$\text{and } k = -\frac{1}{9}$$

$$\underline{\underline{-1 < k < -\frac{1}{9}}}$$





$$(9) \quad i) \quad x^2 + y^2 - 2x + 10y - 19 = 0$$

$$(x-1)^2 - 1 + (y+5)^2 - 25 - 19 = 0$$

$$(x-1)^2 + (y+5)^2 = 45$$

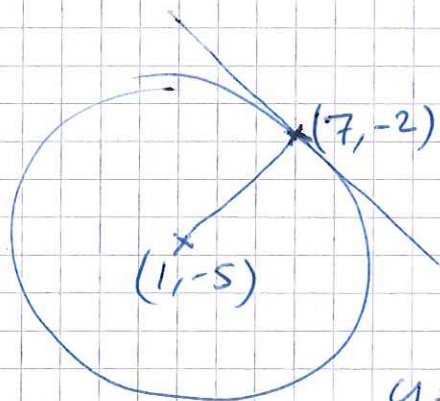
Centre :  $(1, -5)$       radius =  $\sqrt{45}$

$$ii) \quad \cancel{42} \quad (7-1)^2 + (-2+5)^2 = 45$$

$$6^2 + 3^2 = 45$$

$$36 + 9 = 45 \quad \checkmark$$

iii)



~~to~~ gradient of radius

$$= \frac{-2 - (-5)}{7 - 1} = \frac{3}{6} = \frac{1}{2}$$

gradient of tangent = -2

$$y = mx + c$$

$$-2 = -2(7) + c$$

$$-2 = -14 + c$$

$$c = 12$$

$$y = -2x + 12$$

$$\underline{\underline{2x + y - 12 = 0}}$$

