

EXEMPLAR PAPER 1

$$1. \quad m = \frac{dy}{dx} = 2x - 4$$

$$= 2(5) - 4$$

$$= 6$$

$$y - 12 = 6(x - 5)$$

$$y - 12 = 6x - 30$$

$$y = 6x - 18$$

$$2. \quad x = -1 \quad x = 0 \quad x = 2$$

$$y = kx(x+1)(x-2)$$

subs $\begin{pmatrix} 1 \\ 2 \end{pmatrix}$

$$2 = k \times 1(1+1)(1-2)$$

$$2 = k \times 2 \times -1$$

$$2 = -2k$$

$$k = -1$$

$$y = -x(x+1)(x-2)$$

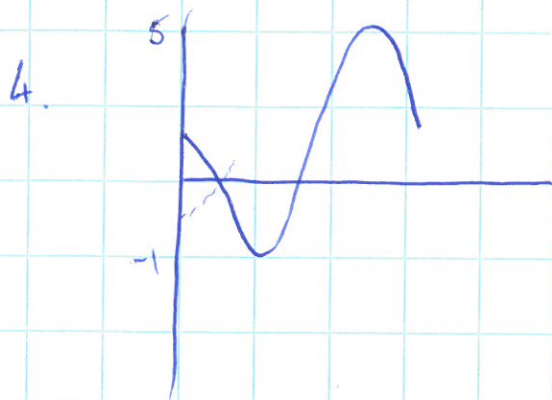


$$3. \quad \int_1^2 \frac{1}{6x^2} dx = \left[-\frac{1}{6x} \right]_1^2 = \left[\frac{-1}{6x} \right]_1^2$$

$$= \left(\frac{-1}{6 \times 2} \right) - \left(\frac{-1}{6 \times 1} \right)$$

$$= \frac{-1}{12} - \left(-\frac{1}{6} \right)$$

$$= \frac{1}{12} \text{ units}^2$$



$$f(x) = -3\sin(x - 60) + 2$$

(B) (D)

$$\frac{330\pi}{180} = \frac{11\pi}{6}$$

$$5a) \begin{array}{c|cccc} 1 & 1 & -4 & a & b \\ & 1 & -3 & -3+a & \\ \hline & 1 & -3 & -3+a & 0 \end{array}$$

$$2) \begin{array}{c|cccc} 1 & 1 & -4 & a & b \\ & 2 & -4 & -8+2a & \\ \hline & 1 & -2 & -4+a & -12 \end{array}$$

$$-3+a+b=0 \quad (1)$$

$$-8+2a+b=-12 \quad (2)$$

$$(2) - (1) \quad -5+a = -12$$

$$a = -7$$

$$-3+(-7)+b=0$$

$$b=10$$

$$b) (x-1)(x^2-3x-10)$$

$$x=1 \quad (x-5)(x+2)$$

$$x=5 \quad x=-2$$

$$6. \text{Midpa} = \left(\frac{3-1}{2}, \frac{-3+a}{2} \right) = (1, 3)$$

$$m_{pa} = \frac{-3-9}{3-1} = \frac{-12}{2} = -6$$

$$y-3 = \frac{1}{3}(x-1)$$

$$3y-9 = x-1$$

$$3y-x = 8$$

$$m_{\perp} = \frac{1}{3}$$

$$b) m = -3 \quad y+2 = -3(x-1)$$

$$y+2 = -3x+3$$

$$y+3x = 1$$

$$b) \quad 3y - x = 8 \quad \times 3$$

$$y + 3x = 1$$

$$9y - 3x = 24$$

$$10y = 25$$

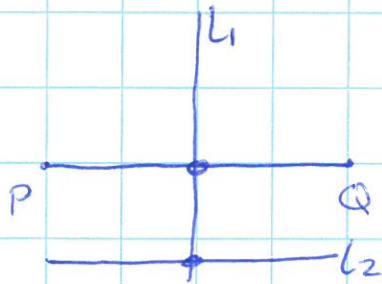
$$y = 2.5$$

$$7.5 - x = 8$$

$$x = -1/2$$

$$\left(-\frac{1}{2}, \frac{5}{2}\right)$$

d)



$$(1, 3)$$

$$\sqrt{\left(1 - \frac{1}{2}\right)^2 + \left(3 - \frac{5}{2}\right)^2}$$

$$= \sqrt{\left(\frac{3}{2}\right)^2 + \left(\frac{1}{2}\right)^2} = \sqrt{\frac{9}{4} + \frac{1}{4}} = \sqrt{\frac{10}{4}} = \frac{\sqrt{10}}{2}$$

$$7a) \quad (2\cos^2 x - 1) - 3\cos x + 2 = 0$$

$$2\cos^2 x - 3\cos x + 1 = 0$$

$$(2\cos x - 1)(\cos x - 1)$$

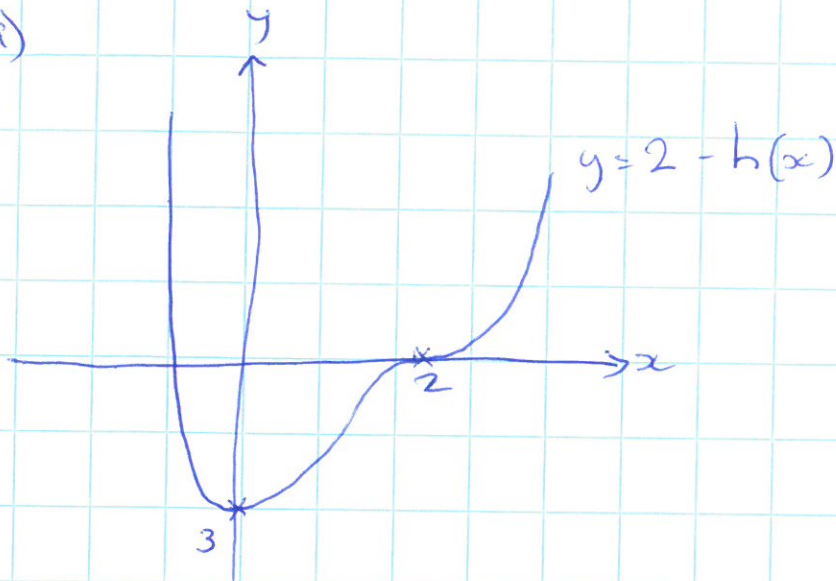
$$\cos x = \frac{1}{2} \quad \cos x = 1$$

$$x = 60^\circ, 300^\circ \quad x = 0, 360^\circ$$

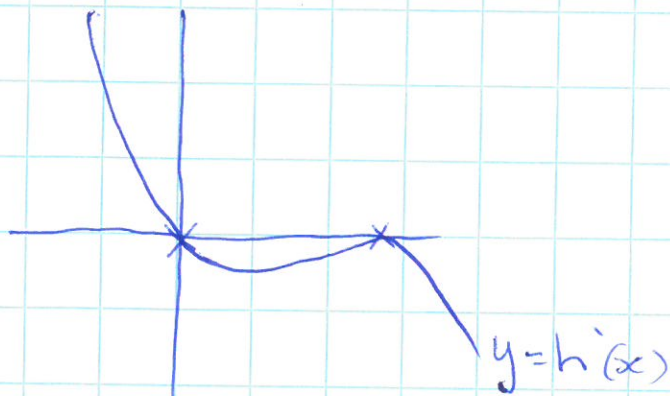
$$b) \quad 2x = 0, 60, 300, 360, 420, 660$$

$$x = 0, 30, 150, 180, 210, 330$$

8 a)



b)



$$9. a) k \cos(4x + a) = k \cos 4x \cos a - k \sin 4x \sin a$$

$$\cos 4x - \sqrt{3} \sin 4x$$

$$k \cos a = 1$$

$$-k \sin a = -\sqrt{3}$$

$$k \sin a = \sqrt{3}$$

$$k = \sqrt{\sqrt{3}^2 + 1^2}$$

$$= 2$$

$$\tan a = \frac{\sqrt{3}}{1} = \sqrt{3}$$

$$a = \frac{\pi}{3}$$

$$b) 2 \cos\left(4x + \frac{\pi}{3}\right) = 0$$

$$\cos\left(4x + \frac{\pi}{3}\right) = 0$$

$$4x + \frac{\pi}{3} = \frac{\pi}{2}, \frac{3\pi}{2}$$

$$4x = \frac{\pi}{2} - \frac{\pi}{3}, \frac{3\pi}{2} - \frac{\pi}{3}$$

$$x = \frac{\pi}{24}, \frac{7\pi}{24}$$

$$10 a) y = \int 3 \cos 2x \, dx$$

$$y = \frac{3}{2} \sin 2x + c$$

$$\sqrt{3} = \frac{3}{2} \sin\left(2 \times \frac{7\pi}{6}\right) + c$$

$$\sqrt{3} = \frac{3}{2} \sin\left(\frac{14\pi}{6}\right) + c$$

$$\sqrt{3} = \frac{3}{2} \sin\left(\frac{\pi}{3}\right) + c$$

$$\sqrt{3} = \frac{3}{2} \times \frac{\sqrt{3}}{2} + c$$

$$\sqrt{3} = \frac{3\sqrt{3}}{4} + c$$

$$c = \sqrt{3} - \frac{3\sqrt{3}}{4}$$

$$= \frac{4\sqrt{3}}{4} - \frac{3\sqrt{3}}{4}$$

$$= \frac{\sqrt{3}}{4}$$

$$y = \frac{3}{2} \sin 2x + \frac{\sqrt{3}}{4}$$

$$11 a) k(x) = 3(x^3 - 1) + 1 \\ = 3x^3 - 2$$

$$b) h(x) = k^{-1}(x)$$

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

$$h(x) = \sqrt[3]{\frac{x+2}{3}}$$

$$x = \sqrt[3]{\frac{y+2}{3}}$$

$$y = \sqrt[3]{\frac{x+2}{3}}$$