

Cambridge International AS & A Level

Mathematics 9709

Paper 1 Pure Mathematics 1

Topic 2-Functions

Question No (9)

<http://kingcambridgesolutions.com>

WhatsApp +923454231525

Rs:300/Paper

Question No (9)

The function f is defined by $f : x \rightarrow 5 - 3 \sin 2x$ $0 \leq x \leq \pi$.

(i) Find the range of f .

(ii) Sketch the graph of $y = f(x)$.

(iii) State, with a reason, whether f has an inverse.

Solution

$$f(x) = 5 - 3 \sin 2x \quad \text{for } 0 \leq x \leq \pi$$

$$y = 5 - 3 \sin 2x$$

As $-1 \leq \sin x \leq 1$ (Sine min and max values)
we shall make $\sin x$ as given for)

$$-1 \leq \sin 2x \leq 1$$

$$3 \geq -3 \sin 2x \geq -3 \quad \begin{matrix} \leftarrow a \leq b \\ -a \geq -b \end{matrix}$$

$$-3 \leq -3 \sin 2x \leq 3$$

adding 5

$$5-3 \leq 5-3 \sin 2x \leq 5+3$$

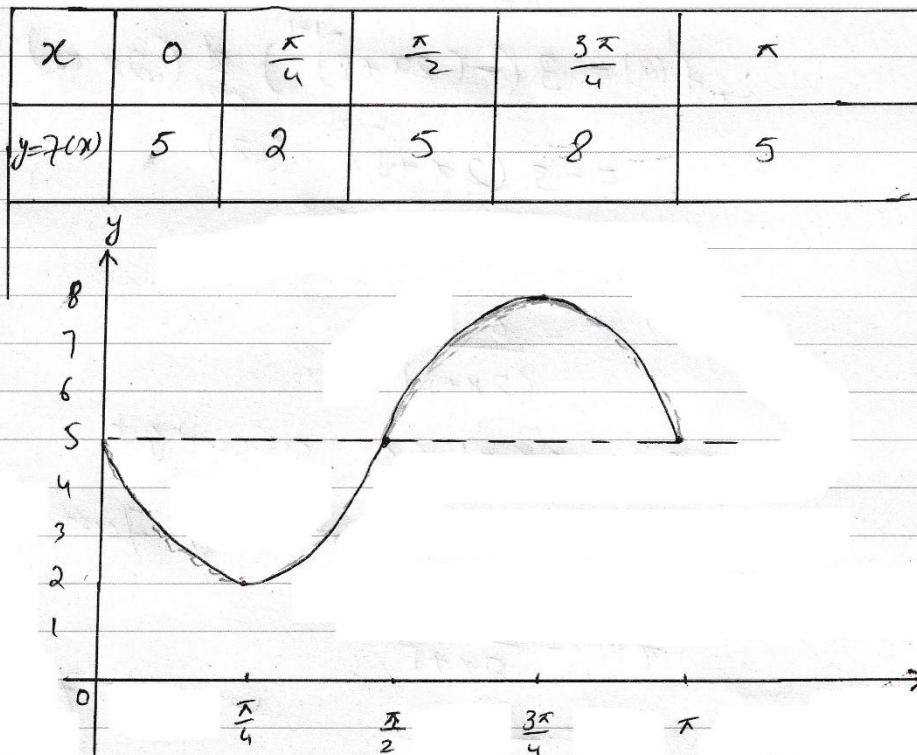
$$2 \leq 5-3 \sin 2x \leq 8$$

$$\Rightarrow 2 \leq f(x) \leq 8 \quad \leftarrow f(x) = 5-3 \sin 2x$$

$\therefore$ range of f is

$$2 \leq f(x) \leq 8$$

(ii) Now we sketch the graph of
 $y = f(x) = 5 - 3 \sin 2x$
 as the given interval is $0 \leq x \leq \pi$



(iii) $f(x)$ has no inverse as horizontal line test fail for $f(x)$. (Horizontal line cut the graph on more than one places).

