

(Transforming trigonometric functions)

Q1. A function f is defined by $f: x \rightarrow 5 - 2 \sin 2x$ for $0 \leq x \leq \pi$

- (i) Find the range of f . ②
 - (ii) Sketch the graph of $y = f(x)$. ②
 - (iii) Solve the equation $f(x) = 6$, giving answer in terms of π . ③
- The function g is defined by $g: x \rightarrow 5 - 2 \sin 2x$, for $0 \leq x \leq k$, where k is a constant.
- (iv) State the largest value of k for which g has an inverse. ①
 - (v) For this value of k , find expression for $g^{-1}(x)$. ③

W-16/12/Q10

Q2 The function $f(x)$ is defined by:

$f: x \rightarrow 4 \sin x - 1$ for $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$

- (i) State range of f . ②
- (ii) Find the coordinates of points at which the curve $y = f(x)$, intersects the coordinate axes. ③
- (iii) Sketch the graph of $y = f(x)$. ②
- (iv) Obtain an expression for $f^{-1}(x)$, stating both the domain and range of f^{-1} . ④

S-16/11/Q11

Q3 The function $f: x \rightarrow 5 + 3 \cos(\frac{x}{2})$ is defined for $0 \leq x \leq 2\pi$

- (i) Solve the equation $f(x) = 7$, giving your answer correct to 2 decimal places. ③
- (ii) Sketch the graph of $y = f(x)$. ②
- (iii) Explain why f has an inverse. ①
- (iv) Obtain an expression for $f^{-1}(x)$. ③

S-15/11/Q8

Q4. The function $f: x \rightarrow 6 - 4 \cos \frac{x}{2}$ is defined for $0 \leq x \leq 2\pi$

- (i) Find the exact value of x for which $f(x) = 4$. ③
- (ii) State the range of f . ②
- (iii) Sketch the graph of $y = f(x)$. ②
- (iv) Find an expression for $f^{-1}(x)$. ③

W-14/12/Q11

P1

Trigonometry (Transforming trig functions)
Exercise - 2

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Q5 A function f is defined by $f: x \rightarrow 3 \cos x - 2$ for $0 < x \leq 2\pi$

- (i) Solve the equation $f(x) = 0$ ③
- (ii) Find the range of f . ②
- (iii) Sketch the graph of $y = f(x)$ ②

A function g is defined by $g: x \rightarrow 3 \cos x - 2$ for $0 \leq x \leq \kappa$

- (iv) State the maximum value of κ for which g has an inverse, ①
- (v) Obtain an expression for $g^{-1}(x)$ ②

W-13 | 12 | Q8

Q6 The functions f and g are defined for $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$ by

$$f(x) = \frac{x}{2} + \frac{\pi}{6}$$

$$g(x) = \cos x$$

Solve the following equations for $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$

- (i) $gf(x) = 1$, giving your answer in terms of π ②
- (ii) $fg(x) = 1$, giving your answer correct to 2 decimal places. ④

W-12 | 13 | Q6

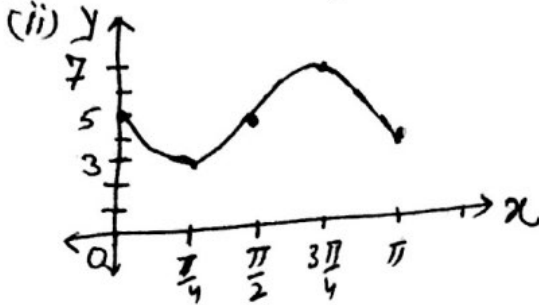
① Trigonometry

Exercise 2

Answers Page 1

Transforming Trig. functions Q4 (i) $x = \frac{2}{3}\pi \left\{ \cos \frac{x}{2} = \frac{1}{2} \right\}$

Q1 (i) $3 \leq f(x) \leq 7$



(iii) 1.83° or $2.88^\circ \left[\begin{aligned} \sin 2x &= -\frac{1}{2} \\ 2x &= \frac{7\pi}{6} \text{ or } \frac{11\pi}{6} \end{aligned} \right]$

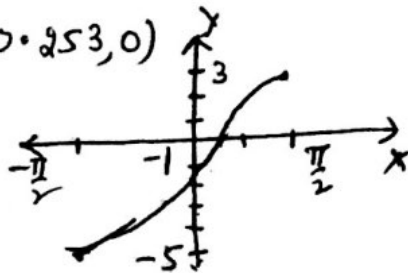
(iv) $k = \frac{\pi}{4}$

(v) $g^{-1}(x) = \frac{1}{2} \sin^{-1} \left(\frac{5-x}{2} \right)$

Q2 (i) Range $-5 \leq f(x) \leq 3$

(ii) $(0, -1), (0.253, 0)$

(iii)

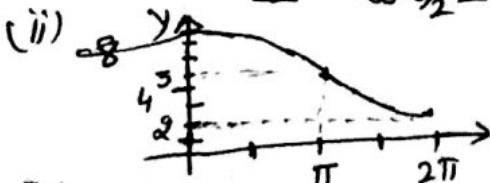


(iv) Range $-\frac{\pi}{2} \leq f^{-1}(x) \leq \frac{\pi}{2}$

domain $-5 \leq x \leq 3$

$f^{-1}(x) = \sin^{-1} \left(\frac{x+1}{4} \right)$

Q3 (i) $x = 1.68 \left[\begin{aligned} 0 \leq x/2 \leq \pi \\ \cos x/2 = 2/3 \end{aligned} \right]$

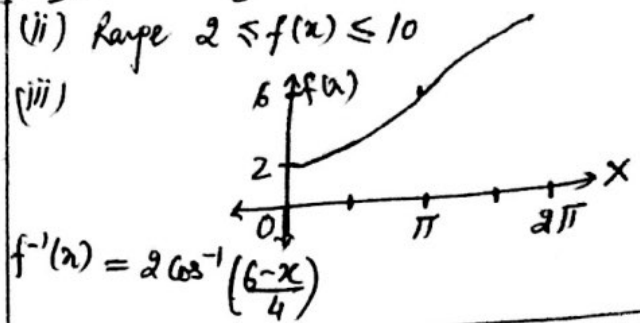


(iii) $f(x)$ has no turning point $0 \leq x \leq 2\pi$

(iv) $f^{-1}(x) = 2 \cos^{-1} \left(\frac{x-5}{3} \right)$

(ii) Range $2 \leq f(x) \leq 10$

(iii)

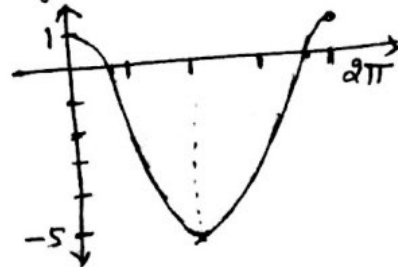


$f^{-1}(x) = 2 \cos^{-1} \left(\frac{6-x}{4} \right)$

Q5 (i) $x = 0.841$ or $5.44 \left\{ \cos x = \frac{2}{3} \right\}$

(ii) Range $-5 \leq f(x) \leq 1$

(iii)



(iv) Max Value of $k = \pi$

(v) $g^{-1}(x) = \cos^{-1} \left(\frac{x+2}{3} \right)$

Q6 (i) $x = -\frac{\pi}{3} \left\{ \cos \left(\frac{x}{2} + \frac{\pi}{6} \right) = 1 \right\}$

(ii) $x = \pm 0.31 \left\{ \begin{aligned} \frac{1}{2} \cos x + \frac{\pi}{6} &= 1 \\ \cos x &= 0.9528 \end{aligned} \right.$