

## EXERCISE 6.1

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1. Sketch the graphs of the following functions:

(i)  $f(x) = 2 \sin x$ ,  $0 \leq x \leq \pi$

(ii)  $g(x) = 3 \sin(x - \pi/4)$ ,  $0 \leq x \leq 5\pi/4$

(iii)  $h(x) = 2 \sin 3x$ ,  $0 \leq x \leq 2\pi/3$

(iv)  $\phi(x) = 2 \sin(2x - \pi/3)$ ,  $0 \leq x \leq 7\pi/3$

(v)  $\Psi(x) = 4 \sin 3(x - \pi/4)$ ,  $0 \leq x \leq 2\pi$

(vi)  $\theta(x) = \sin(x/2 - \pi/4)$ ,  $0 \leq x \leq 4\pi$

(vii)  $u(x) = \sin^2 x$ ,  $0 \leq x \leq 2\pi$   $v(x) = |\sin x|$ ,  $0 \leq x \leq 2\pi$

(viii)  $f(x) = 2 \sin \pi x$ ,  $0 \leq x \leq 2$

**Solution:**

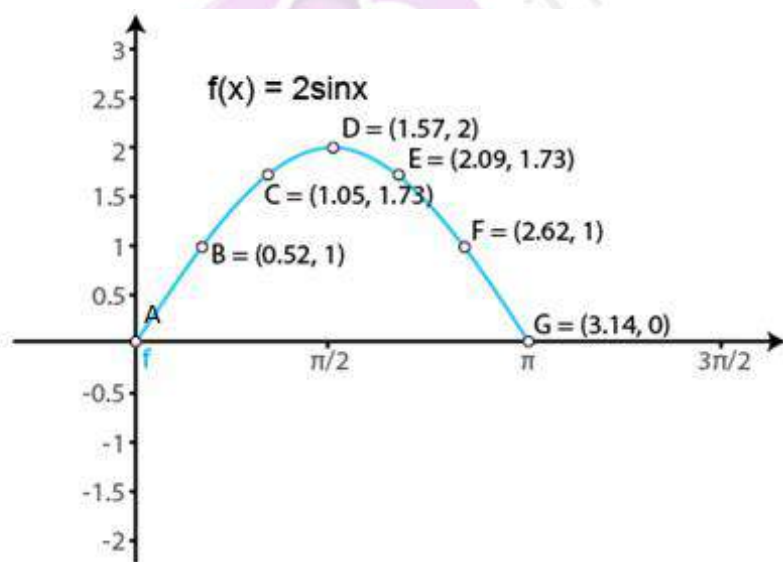
(i)  $f(x) = 2 \sin x$ ,  $0 \leq x \leq \pi$

We know that  $g(x) = \sin x$  is a periodic function with period  $\pi$ .

So,  $f(x) = 2 \sin x$  is a periodic function with period  $\pi$ . So, we will draw the graph of  $f(x) = 2 \sin x$  in the interval  $[0, \pi]$ . The values of  $f(x) = 2 \sin x$  at various points in  $[0, \pi]$  are listed in the following table:

x	0(A)	$\pi/6$ (B)	$\pi/3$ (C)	$\pi/2$ (D)	$2\pi/3$ (E)	$5\pi/6$ (F)	$\pi$ (G)
$f(x) = 2 \sin x$	0	1	$\sqrt{3} = 1.73$	2	$\sqrt{3} = 1.73$	1	0

The required curve is:



(ii)  $g(x) = 3 \sin(x - \pi/4)$ ,  $0 \leq x \leq 5\pi/4$

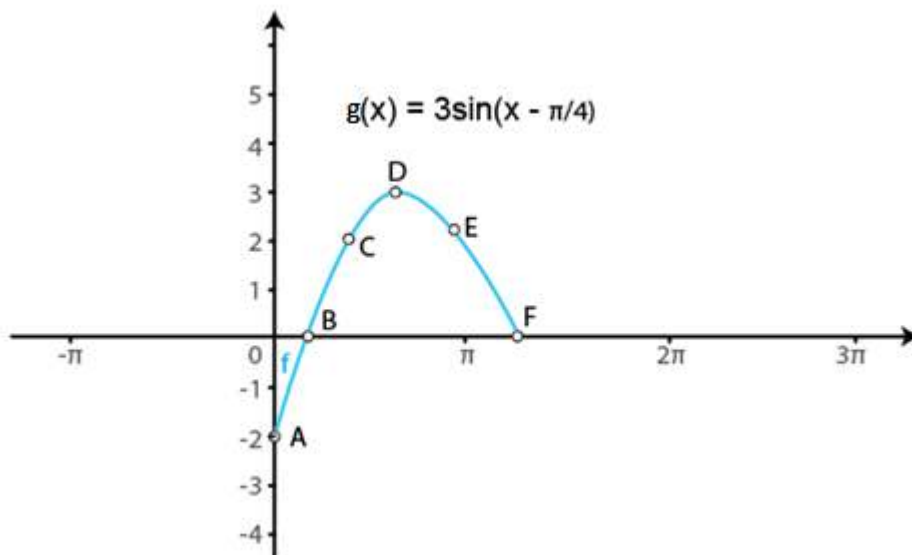
We know that if  $f(x)$  is a periodic function with period  $T$ , then  $f(ax + b)$  is periodic with

period  $T/|a|$ .

So,  $g(x) = 3 \sin(x - \pi/4)$  is a periodic function with period  $\pi$ . So, we will draw the graph of  $g(x) = 3 \sin(x - \pi/4)$  in the interval  $[0, 5\pi/4]$ . The values of  $g(x) = 3 \sin(x - \pi/4)$  at various points in  $[0, 5\pi/4]$  are listed in the following table:

x	0(A)	$\pi/4$ (B)	$\pi/2$ (C)	$3\pi/4$ (D)	$\pi$ (E)	$5\pi/4$ (F)
$g(x) = 3 \sin(x - \pi/4)$	$-3/\sqrt{2} = -2.1$	0	$3/\sqrt{2} = 2.12$	3	$3/\sqrt{2} = 2.12$	0

The required curve is:



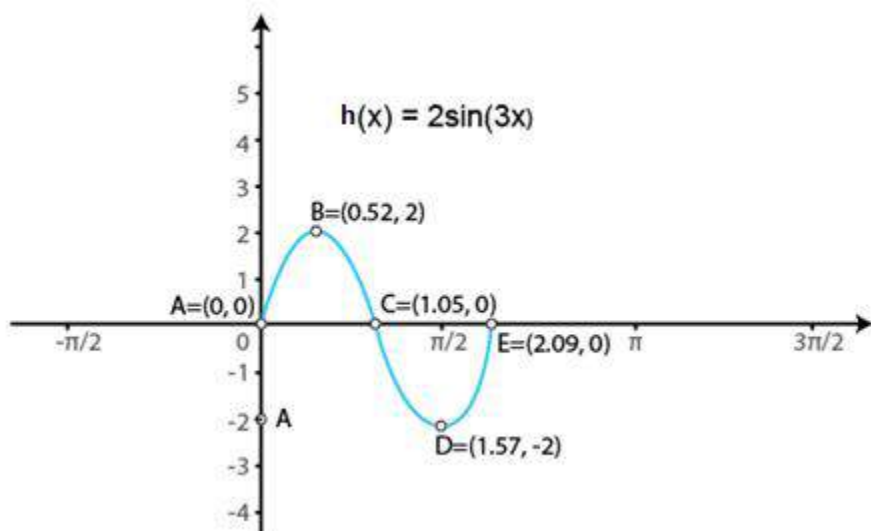
(iii)  $h(x) = 2 \sin 3x$ ,  $0 \leq x \leq 2\pi/3$

We know that  $g(x) = \sin x$  is a periodic function with period  $2\pi$ .

So,  $h(x) = 2 \sin 3x$  is a periodic function with period  $2\pi/3$ . So, we will draw the graph of  $h(x) = 2 \sin 3x$  in the interval  $[0, 2\pi/3]$ . The values of  $h(x) = 2 \sin 3x$  at various points in  $[0, 2\pi/3]$  are listed in the following table:

x	0 (A)	$\pi/6$ (B)	$\pi/3$ (C)	$\pi/2$ (D)	$2\pi/3$ (E)
$h(x) = 2 \sin 3x$	0	2	0	-2	0

The required curve is:



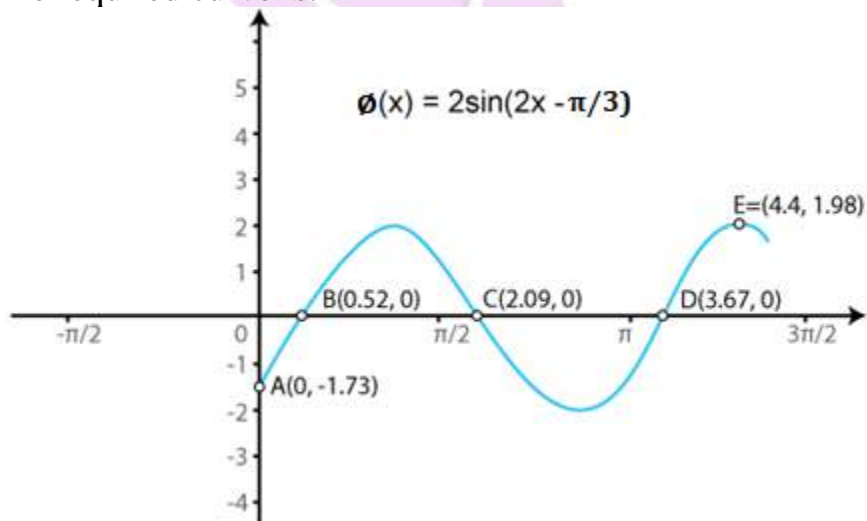
(iv)  $\phi(x) = 2 \sin(2x - \pi/3)$ ,  $0 \leq x \leq 7\pi/3$

We know that if  $f(x)$  is a periodic function with period  $T$ , then  $f(ax + b)$  is periodic with period  $T/|a|$ .

So,  $\phi(x) = 2 \sin(2x - \pi/3)$  is a periodic function with period  $\pi$ . So, we will draw the graph of  $\phi(x) = 2 \sin(2x - \pi/3)$ , in the interval  $[0, 7\pi/5]$ . The values of  $\phi(x) = 2 \sin(2x - \pi/3)$ , at various points in  $[0, 7\pi/5]$  are listed in the following table:

x	0 (A)	$\pi/6$ (B)	$2\pi/3$ (C)	$7\pi/6$ (D)	$7\pi/5$ (E)
$\phi(x) = 2 \sin(2x - \pi/3)$	$-\sqrt{3} = -1.73$	0	0	0	1.98

The required curve is:



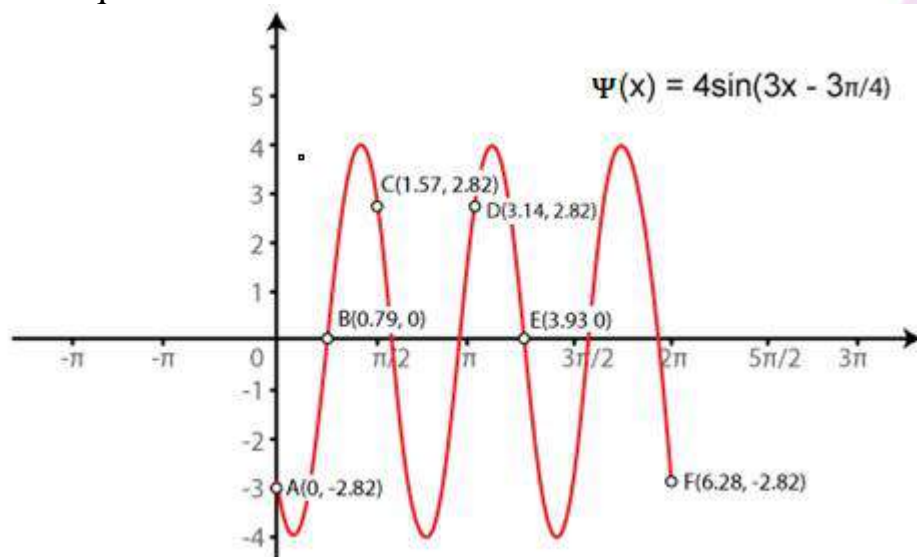
(v)  $\Psi(x) = 4 \sin 3(x - \pi/4)$ ,  $0 \leq x \leq 2\pi$

We know that if  $f(x)$  is a periodic function with period  $T$ , then  $f(ax + b)$  is periodic with period  $T/|a|$ .

So,  $\Psi(x) = 4 \sin 3(x - \pi/4)$  is a periodic function with period  $2\pi$ . So, we will draw the graph of  $\Psi(x) = 4 \sin 3(x - \pi/4)$  in the interval  $[0, 2\pi]$ . The values of  $\Psi(x) = 4 \sin 3(x - \pi/4)$  at various points in  $[0, 2\pi]$  are listed in the following table:

$x$	0 (A)	$\pi/4$ (B)	$\pi/2$ (C)	$\pi$ (D)	$5\pi/4$ (E)	$2\pi$ (F)
$\Psi(x) = 4 \sin 3(x - \pi/4)$	$-2\sqrt{2} = -2.82$	0	$2\sqrt{2} = 2.82$	0	1.98	$-2\sqrt{2} = -2.82$

The required curve is:



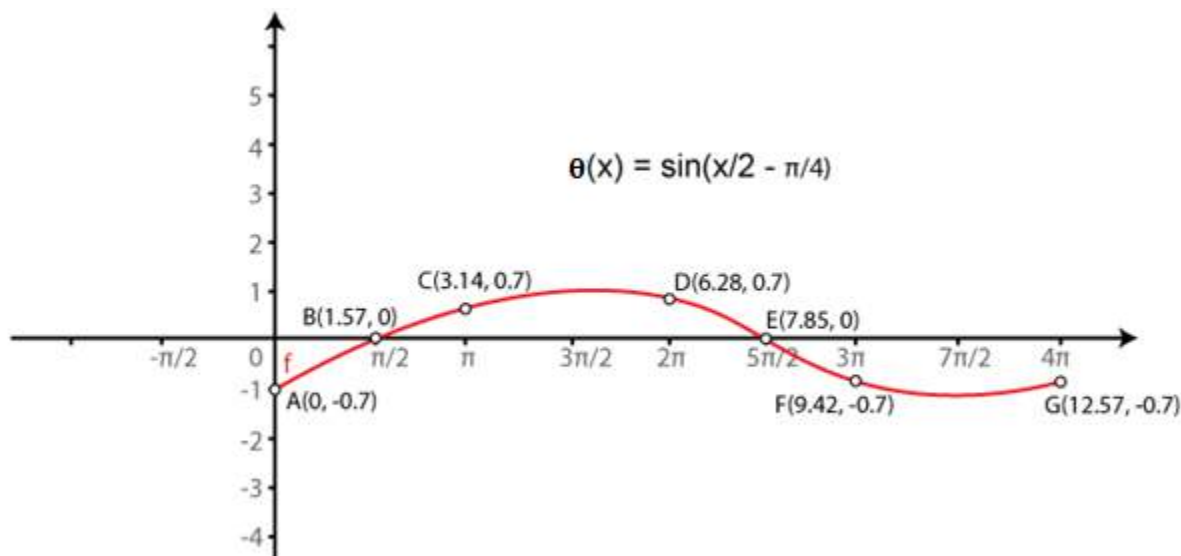
(vi)  $\theta(x) = \sin(x/2 - \pi/4)$ ,  $0 \leq x \leq 4\pi$

We know that if  $f(x)$  is a periodic function with period  $T$ , then  $f(ax + b)$  is periodic with period  $T/|a|$ .

So,  $\theta(x) = \sin(x/2 - \pi/4)$  is a periodic function with period  $4\pi$ . So, we will draw the graph of  $\theta(x) = \sin(x/2 - \pi/4)$  in the interval  $[0, 4\pi]$ . The values of  $\theta(x) = \sin(x/2 - \pi/4)$  at various points in  $[0, 4\pi]$  are listed in the following table:

$x$	0 (A)	$\pi/2$ (B)	$\pi$ (C)	$2\pi$ (D)	$5\pi/2$ (E)	$3\pi$ (F)	$4\pi$ (G)
$\theta(x) = \sin(x/2 - \pi/4)$	$-1/\sqrt{2} = -0.7$	0	$1/\sqrt{2} = 0.7$	$1/\sqrt{2} = 0.7$	0	$-1/\sqrt{2} = -0.7$	$-1/\sqrt{2} = -0.7$

The required curve is:



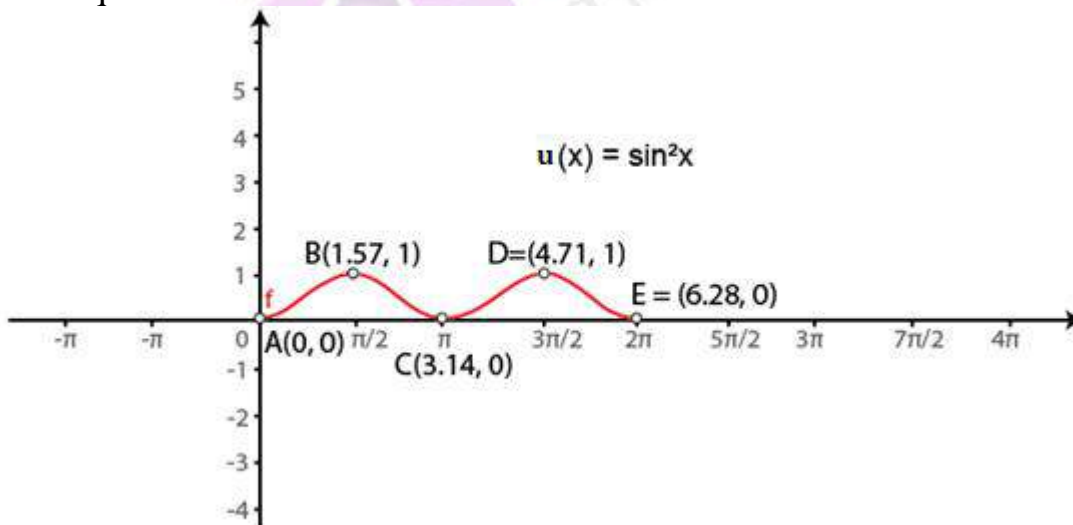
(vii)  $u(x) = \sin^2 x$ ,  $0 \leq x \leq 2\pi$   $v(x) = |\sin x|$ ,  $0 \leq x \leq 2\pi$

We know that  $g(x) = \sin x$  is a periodic function with period  $\pi$ .

So,  $u(x) = \sin^2 x$  is a periodic function with period  $2\pi$ . So, we will draw the graph of  $u(x) = \sin^2 x$  in the interval  $[0, 2\pi]$ . The values of  $u(x) = \sin^2 x$  at various points in  $[0, 2\pi]$  are listed in the following table:

x	0 (A)	$\pi/2$ (B)	$\pi$ (C)	$3\pi/2$ (D)	$2\pi$ (E)
$u(x) = \sin^2 x$	0	1	0	1	0

The required curve is:



(viii)  $f(x) = 2 \sin \pi x$ ,  $0 \leq x \leq 2$

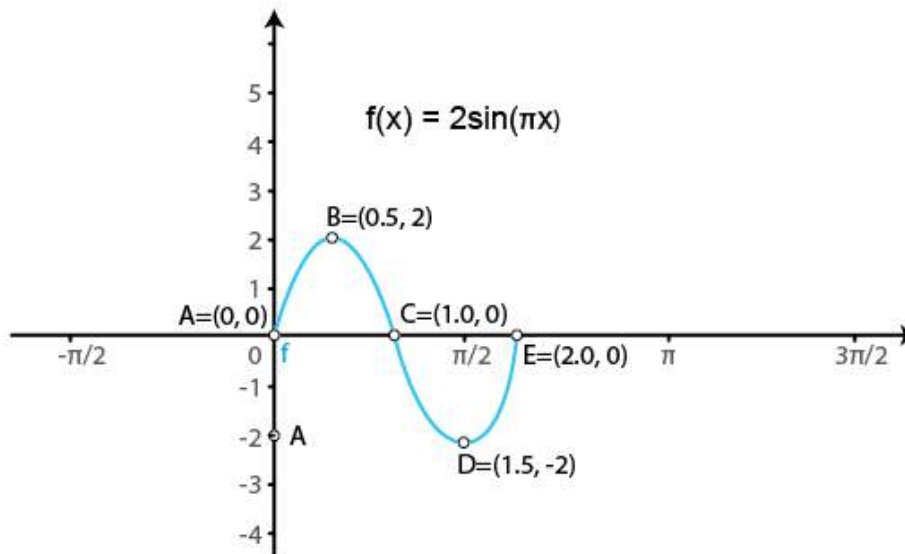
We know that  $g(x) = \sin x$  is a periodic function with period  $2\pi$ .

So,  $f(x) = 2 \sin \pi x$  is a periodic function with period 2. So, we will draw the graph of  $f$

$f(x) = 2 \sin \pi x$  in the interval  $[0, 2]$ . The values of  $f(x) = 2 \sin \pi x$  at various points in  $[0, 2]$  are listed in the following table:

x	0 (A)	1/2 (B)	1 (C)	3/2 (D)	2 (E)
$f(x) = 2 \sin \pi x$	0	2	0	-2	0

The required curve is:



**2. Sketch the graphs of the following pairs of functions on the same axes:**

(i)  $f(x) = \sin x$ ,  $g(x) = \sin(x + \pi/4)$

(ii)  $f(x) = \sin x$ ,  $g(x) = \sin 2x$

(iii)  $f(x) = \sin 2x$ ,  $g(x) = 2 \sin x$

(iv)  $f(x) = \sin x/2$ ,  $g(x) = \sin x$

**Solution:**

(i)  $f(x) = \sin x$ ,  $g(x) = \sin(x + \pi/4)$

We know that the functions  $f(x) = \sin x$  and  $g(x) = \sin(x + \pi/4)$  are periodic functions with periods  $2\pi$  and  $7\pi/4$ .

The values of these functions are tabulated below:

Values of  $f(x) = \sin x$  in  $[0, 2\pi]$

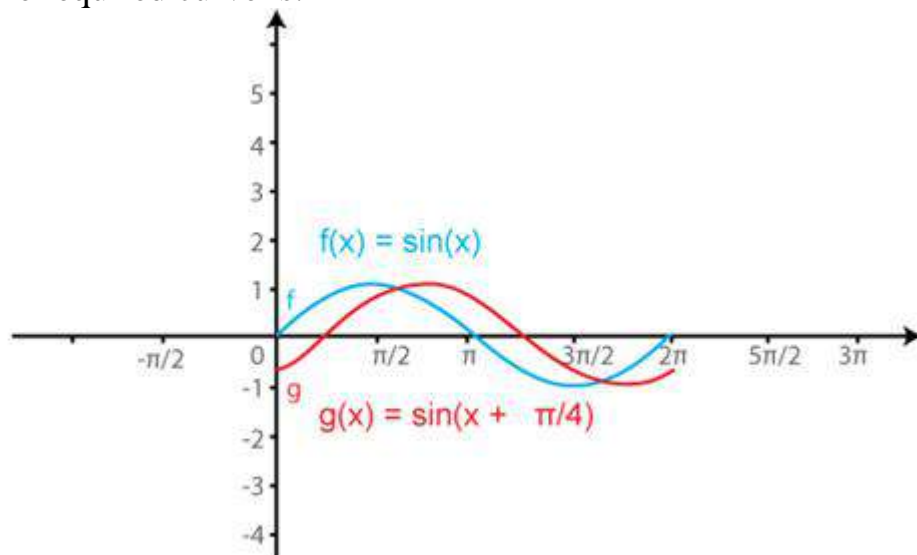
x	0	$\pi/2$	$\pi$	$3\pi/2$	$2\pi$
$f(x) = \sin x$	0	1	0	-1	0

Values of  $g(x) = \sin(x + \pi/4)$  in  $[0, 7\pi/4]$



x	0	$\pi/4$	$3\pi/4$	$5\pi/4$	$7\pi/4$
$g(x) = \sin(x + \pi/4)$	$1/\sqrt{2} = 0.7$	1	0	-1	0

The required curve is:



(ii)  $f(x) = \sin x$ ,  $g(x) = \sin 2x$

We know that the functions  $f(x) = \sin x$  and  $g(x) = \sin 2x$  are periodic functions with periods  $2\pi$  and  $\pi$ .

The values of these functions are tabulated below:

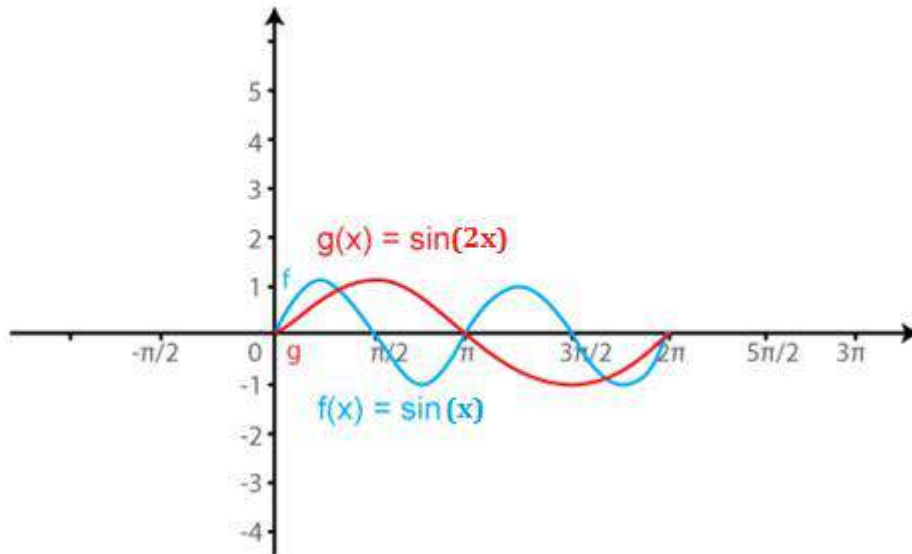
Values of  $f(x) = \sin x$  in  $[0, 2\pi]$

x	0	$\pi/2$	$\pi$	$3\pi/2$	$2\pi$
$f(x) = \sin x$	0	1	0	-1	0

Values of  $g(x) = \sin(2x)$  in  $[0, \pi]$

x	0	$\pi/4$	$\pi/2$	$3\pi/4$	$\pi$	$5\pi/4$	$3\pi/2$	$7\pi/4$	$2\pi$
$g(x) = \sin(2x)$	0	1	0	-1	0	1	0	-1	0

The required curve is:



(iii)  $f(x) = \sin 2x$ ,  $g(x) = 2 \sin x$

We know that the functions  $f(x) = \sin 2x$  and  $g(x) = 2 \sin x$  are periodic functions with periods  $\pi$  and  $\pi$ .

The values of these functions are tabulated below:

Values of  $f(x) = \sin(2x)$  in  $[0, \pi]$

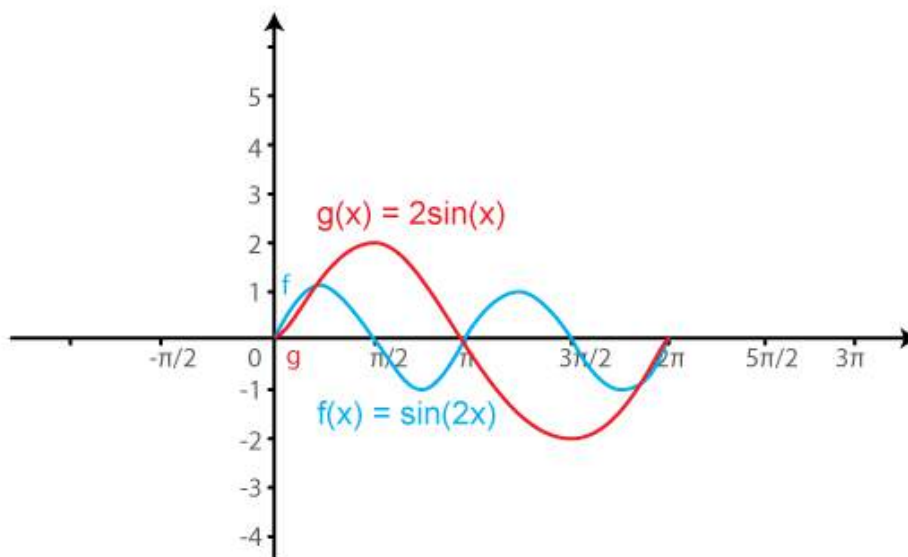
x	0	$\pi/4$	$\pi/2$	$3\pi/4$	$\pi$	$5\pi/4$	$3\pi/2$	$7\pi/4$	$2\pi$
$f(x) = \sin(2x)$	0	1	0	-1	0	1	0	-1	0

Values of  $g(x) = 2 \sin x$  in  $[0, \pi]$

x	0	$\pi/2$	$\pi$	$3\pi/2$	$2\pi$
$g(x) = 2 \sin x$	0	1	0	-1	0

The required curve is:





(iv)  $f(x) = \sin x/2$ ,  $g(x) = \sin x$

We know that the functions  $f(x) = \sin x/2$  and  $g(x) = \sin x$  are periodic functions with periods  $\pi$  and  $2\pi$ .

The values of these functions are tabulated below:

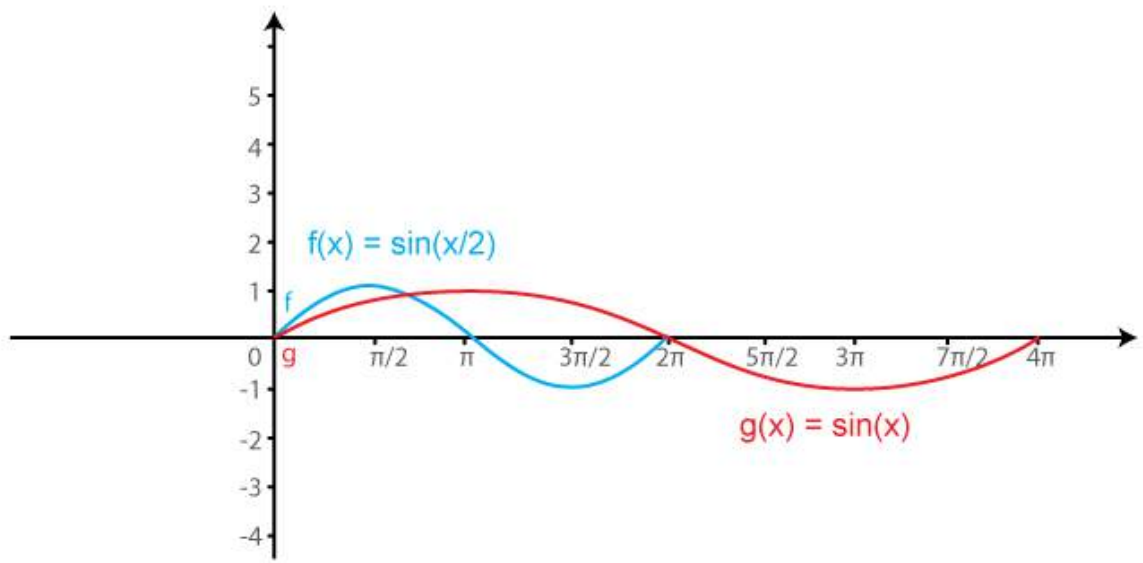
Values of  $f(x) = \sin x/2$  in  $[0, \pi]$

x	0	$\pi$	$2\pi$	$3\pi$	$4\pi$
$f(x) = \sin x/2$	0	1	0	-1	0

Values of  $g(x) = \sin(x)$  in  $[0, 2\pi]$

x	0	$\pi/2$	$\pi$	$3\pi/2$	$2\pi$	$5\pi/2$	$3\pi$	$7\pi/2$	$4\pi$
$g(x) = \sin(x)$	0	1	0	-1	0	1	0	-1	0

The required curve is:



## EXERCISE 6.2

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1. Sketch the graphs of the following trigonometric functions:

- (i)  $f(x) = \cos(x - \pi/4)$
- (ii)  $g(x) = \cos(x + \pi/4)$
- (iii)  $h(x) = \cos^2 2x$
- (iv)  $\phi(x) = 2 \cos(x - \pi/6)$
- (v)  $\psi(x) = \cos(3x)$
- (vi)  $u(x) = \cos^2 x/2$
- (vii)  $f(x) = \cos \pi x$
- (viii)  $g(x) = \cos 2\pi x$

**Solution:**

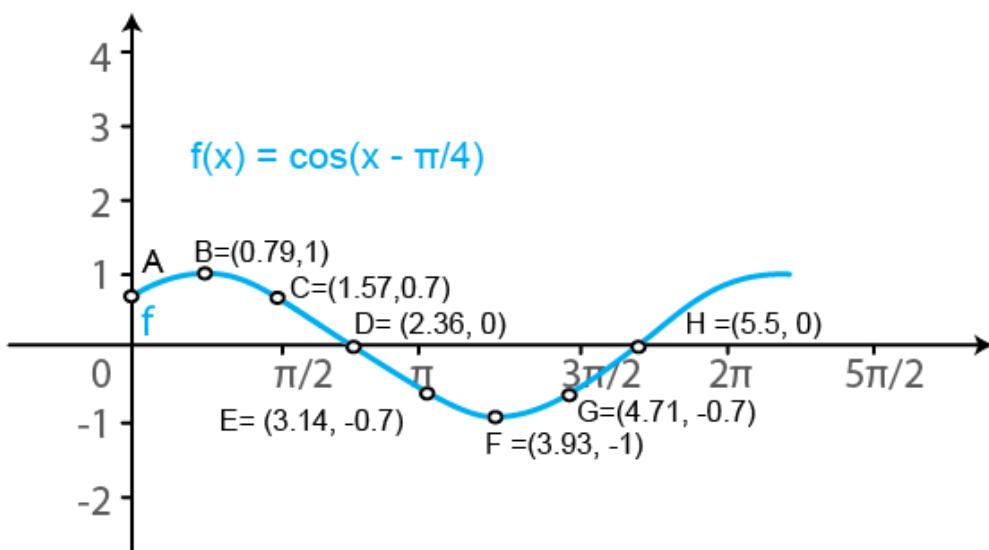
(i)  $f(x) = \cos(x - \pi/4)$

We know that  $g(x) = \cos x$  is a periodic function with period  $2\pi$ .

So,  $f(x) = \cos(x - \pi/4)$  is a periodic function with period  $\pi$ . So, we will draw the graph of  $f(x) = \cos(x - \pi/4)$  in the interval  $[0, \pi]$ . The values of  $f(x) = \cos(x - \pi/4)$  at various points in  $[0, \pi]$  are listed in the following table:

x	0 (A)	$\pi/4$ (B)	$\pi/2$ (C)	$3\pi/4$ (D)	$\pi$ (E)	$5\pi/4$ (F)	$3\pi/2$ (G)	$7\pi/4$ (H)
$f(x) = \cos(x - \pi/4)$	$1/\sqrt{2} = 0.7$	1	$1/\sqrt{2} = 0.7$	0	$-1/\sqrt{2} = -0.7$	-1	$-1/\sqrt{2} = -0.7$	0

The required curve is:



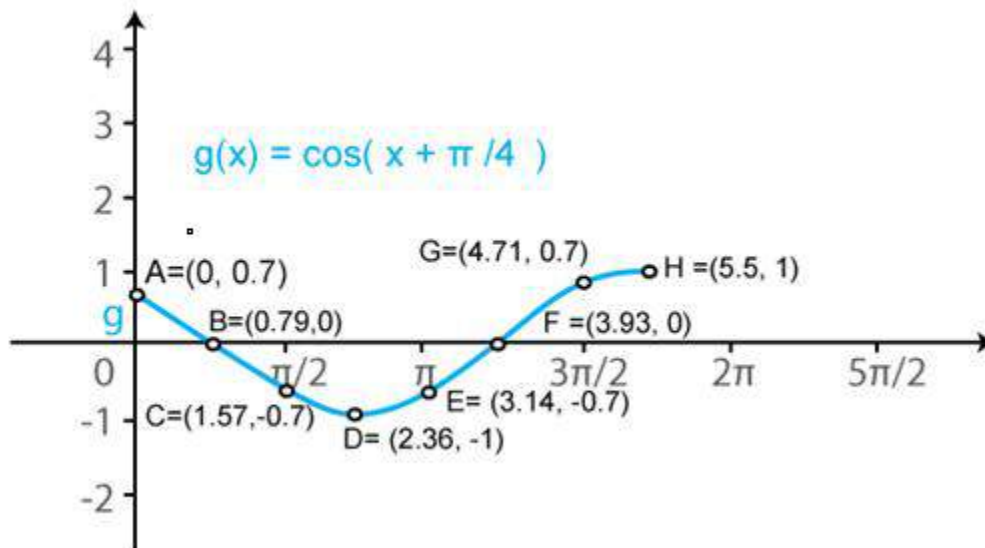
(ii)  $g(x) = \cos(x + \pi/4)$

We know that  $f(x) = \cos x$  is a periodic function with period  $2\pi$ .

So,  $g(x) = \cos(x + \pi/4)$  is a periodic function with period  $\pi$ . So, we will draw the graph of  $g(x) = \cos(x + \pi/4)$  in the interval  $[0, \pi]$ . The values of  $g(x) = \cos(x + \pi/4)$  at various points in  $[0, \pi]$  are listed in the following table:

x	0 (A)	$\pi/4$ (B)	$\pi/2$ (C)	$3\pi/4$ (D)	$\pi$ (E)	$5\pi/4$ (F)	$3\pi/2$ (G)	$7\pi/4$ (H)
$g(x) = \cos(x + \pi/4)$	$1/\sqrt{2} = 0.7$	0	$-1/\sqrt{2} = -0.7$	-1	$-1/\sqrt{2} = -0.7$	0	$1/\sqrt{2} = 0.7$	1

The required curve is:



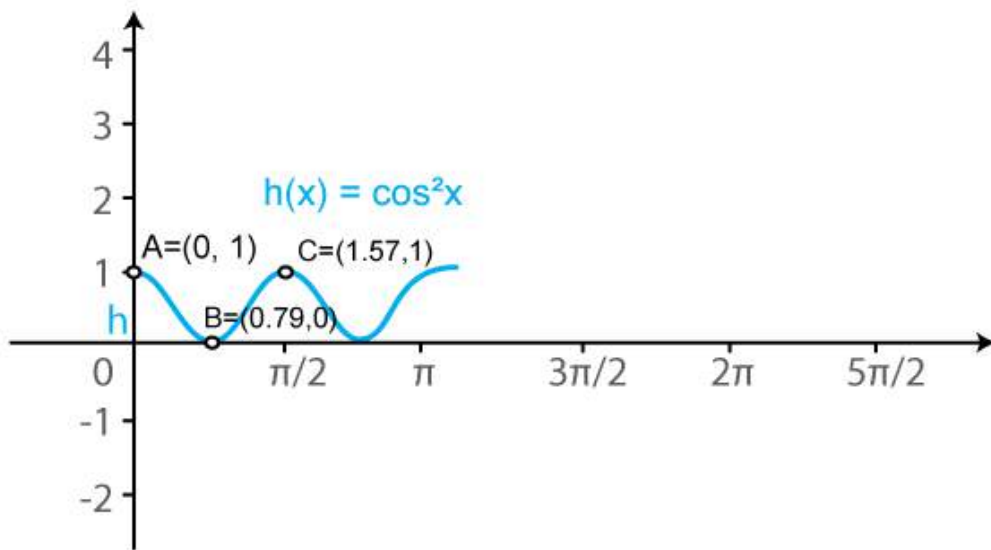
(iii)  $h(x) = \cos^2 2x$

We know that  $f(x) = \cos x$  is a periodic function with period  $2\pi$ .

So,  $h(x) = \cos^2 2x$  is a periodic function with period  $\pi$ . So, we will draw the graph of  $h(x) = \cos^2 2x$  in the interval  $[0, \pi]$ . The values of  $h(x) = \cos^2 2x$  at various points in  $[0, \pi]$  are listed in the following table:

x	0 (A)	$\pi/4$ (B)	$\pi/2$ (C)	$3\pi/4$ (D)	$\pi$ (E)	$5\pi/4$ (F)	$3\pi/2$ (G)
$h(x) = \cos^2 2x$	1	0	1	0	1	0	1

The required curve is:



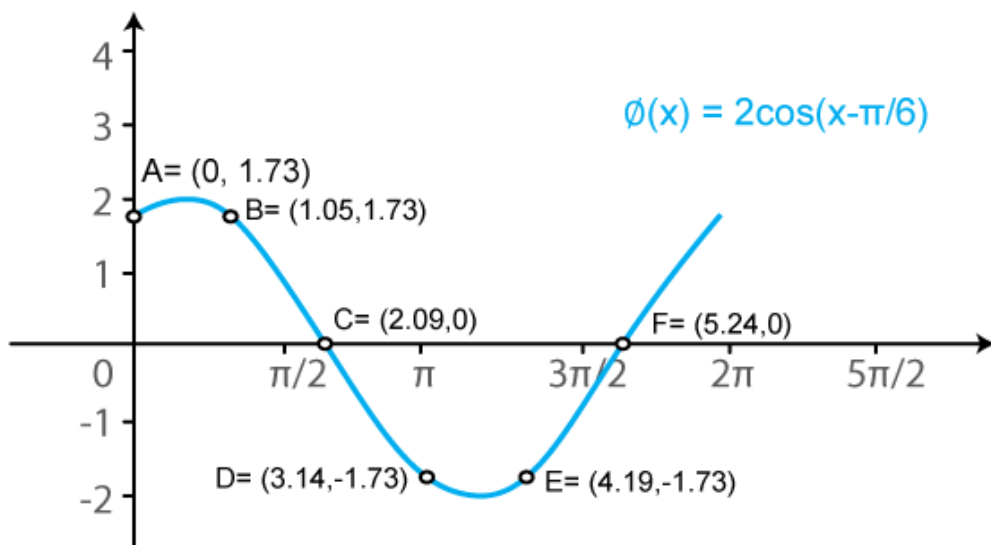
(iv)  $\phi(x) = 2 \cos(x - \pi/6)$

We know that  $f(x) = \cos x$  is a periodic function with period  $2\pi$ .

So,  $\phi(x) = 2\cos(x - \pi/6)$  is a periodic function with period  $\pi$ . So, we will draw the graph of  $\phi(x) = 2\cos(x - \pi/6)$  in the interval  $[0, \pi]$ . The values of  $\phi(x) = 2\cos(x - \pi/6)$  at various points in  $[0, \pi]$  are listed in the following table:

$x$	0 (A)	$\pi/3$ (B)	$2\pi/3$ (C)	$\pi$ (D)	$4\pi/3$ (E)	$5\pi/3$ (F)
$\phi(x) = 2 \cos(x - \pi/6)$	$\sqrt{3} = 1.73$	$\sqrt{3} = 1.73$	0	$-\sqrt{3} = -1.73$	$-\sqrt{3} = -1.73$	0

The required curve is:



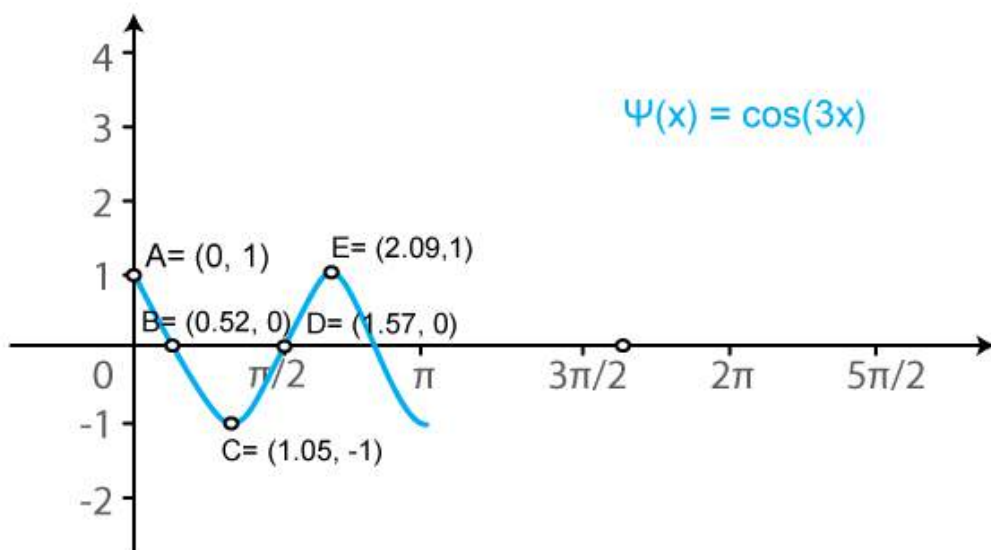
(v)  $\psi(x) = \cos(3x)$

We know that  $f(x) = \cos x$  is a periodic function with period  $2\pi$ .

So,  $\psi(x) = \cos(3x)$  is a periodic function with period  $2\pi/3$ . So, we will draw the graph of  $\psi(x) = \cos(3x)$  in the interval  $[0, 2\pi/3]$ . The values of  $\psi(x) = \cos(3x)$  at various points in  $[0, 2\pi/3]$  are listed in the following table:

x	0 (A)	$\pi/6$ (B)	$\pi/3$ (C)	$\pi/2$ (D)	$2\pi/3$ (E)	$5\pi/6$ (F)
$\psi(x) = \cos(3x)$	1	0	-1	0	1	0

The required curve is:



(vi)  $u(x) = \cos^2 x/2$

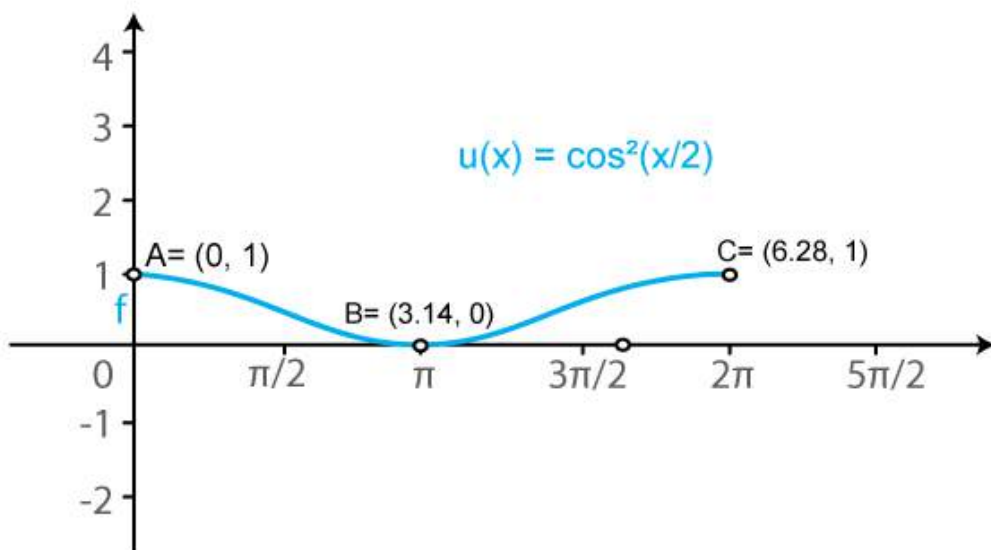
We know that  $f(x) = \cos x$  is a periodic function with period  $2\pi$ .

So,  $u(x) = \cos^2(x/2)$  is a periodic function with period  $\pi$ . So, we will draw the graph of  $u(x) = \cos^2(x/2)$  in the interval  $[0, \pi]$ . The values of  $u(x) = \cos^2(x/2)$  at various points in  $[0, \pi]$  are listed in the following table:

$x$	0 (A)	$\pi$ (B)	$2\pi$ (C)	$3\pi$ (D)
$u(x) = \cos^2 x/2$	1	0	1	0

The required curve is:





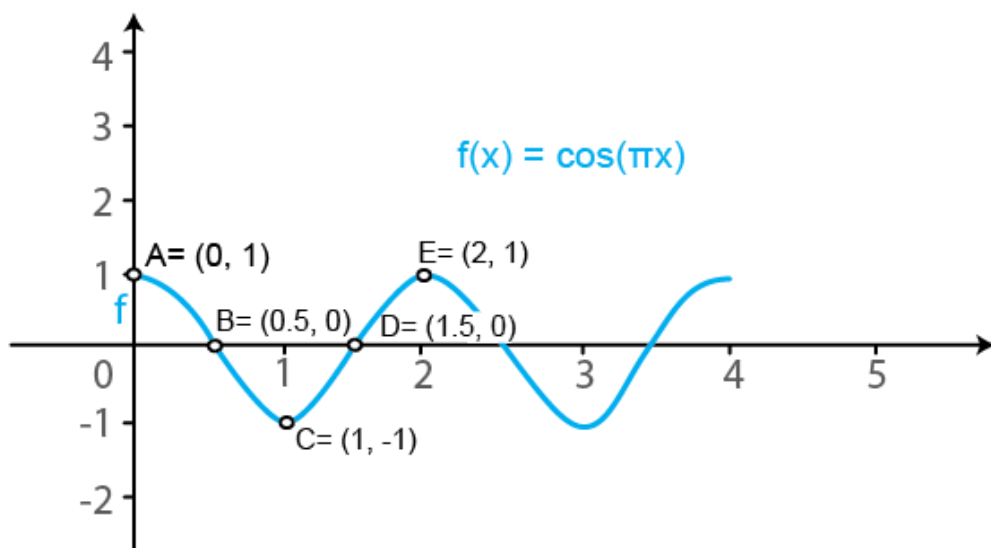
(vii)  $f(x) = \cos \pi x$

We know that  $g(x) = \cos x$  is a periodic function with period  $2\pi$ .

So,  $f(x) = \cos(\pi x)$  is a periodic function with period 2. So, we will draw the graph of  $f(x) = \cos(\pi x)$  in the interval  $[0, 2]$ . The values of  $f(x) = \cos(\pi x)$  at various points in  $[0, 2]$  are listed in the following table:

$x$	0 (A)	1/2 (B)	1 (C)	3/2 (D)	2 (E)	5/2 (F)
$f(x) = \cos \pi x$	1	0	-1	0	1	0

The required curve is:



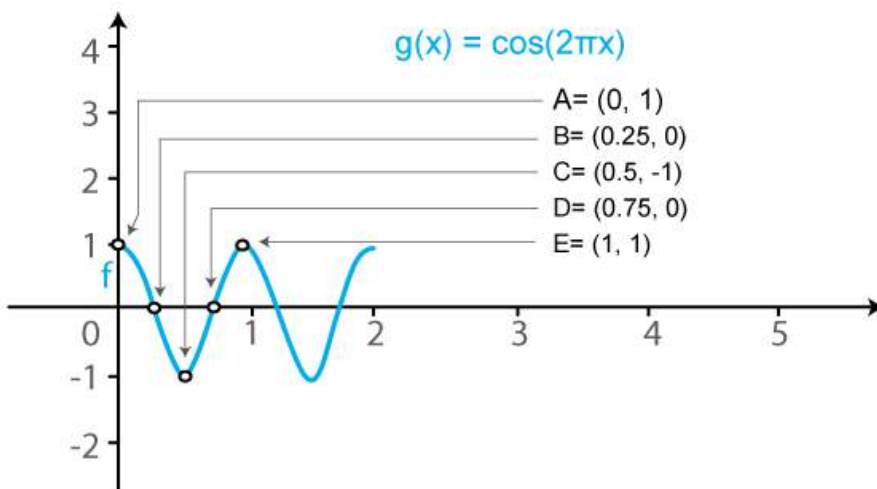
(viii)  $g(x) = \cos 2\pi x$

We know that  $f(x) = \cos x$  is a periodic function with period  $2\pi$ .

So,  $g(x) = \cos(2\pi x)$  is a periodic function with period 1. So, we will draw the graph of  $g(x) = \cos(2\pi x)$  in the interval  $[0, 1]$ . The values of  $g(x) = \cos(2\pi x)$  at various points in  $[0, 1]$  are listed in the following table:

x	0 (A)	1/4 (B)	1/2 (C)	3/4 (D)	1 (E)	5/4 (F)	3/2 (G)	7/4 (H)	2
$g(x) = \cos 2\pi x$	1	0	-1	0	1	0	-1	0	1

The required curve is:



**2. Sketch the graphs of the following curves on the same scale and the same axes:**

- (i)  $y = \cos x$  and  $y = \cos (x - \pi/4)$   
(ii)  $y = \cos 2x$  and  $y = \cos (x - \pi/4)$   
(iii)  $y = \cos x$  and  $y = \cos x/2$   
(iv)  $y = \cos^2 x$  and  $y = \cos x$

**Solution:**

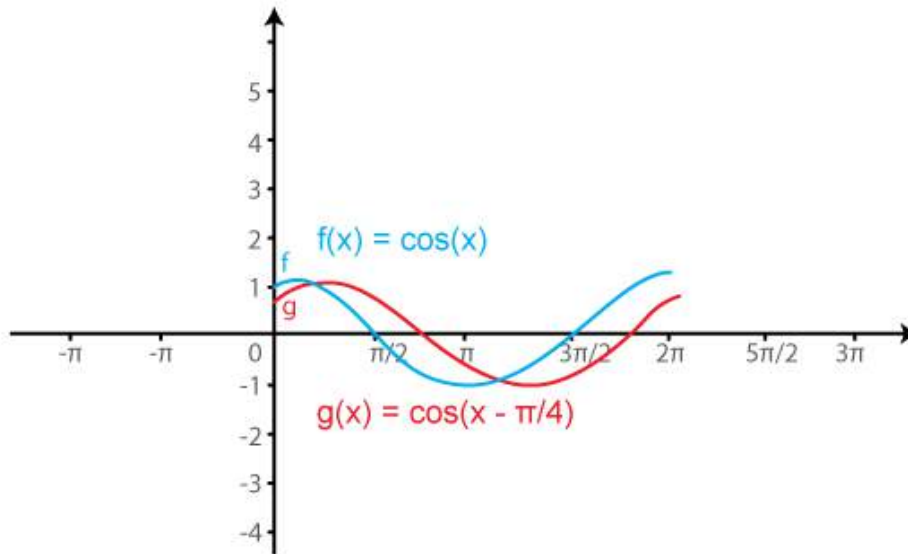
- (i)  $y = \cos x$  and  $y = \cos (x - \pi/4)$

We know that the functions  $y = \cos x$  and  $y = \cos (x - \pi/4)$  are periodic functions with periods  $\pi$  and  $\pi$ .

The values of these functions are tabulated below:

x	0	$\pi/4$	$\pi/2$	$3\pi/4$	$\pi$	$5\pi/4$	$3\pi/2$	$7\pi/4$
$y = \cos x$	1	$1/\sqrt{2} = 0.7$	0	$-1/\sqrt{2} = -0.7$	-1	$-1/\sqrt{2} = -0.7$	0	1
$y = \cos (x - \pi/4)$	$1/\sqrt{2} = 0.7$	1	$1/\sqrt{2} = 0.7$	0	$-1/\sqrt{2} = -0.7$	-1	$-1/\sqrt{2} = -0.7$	0

The required curve is:



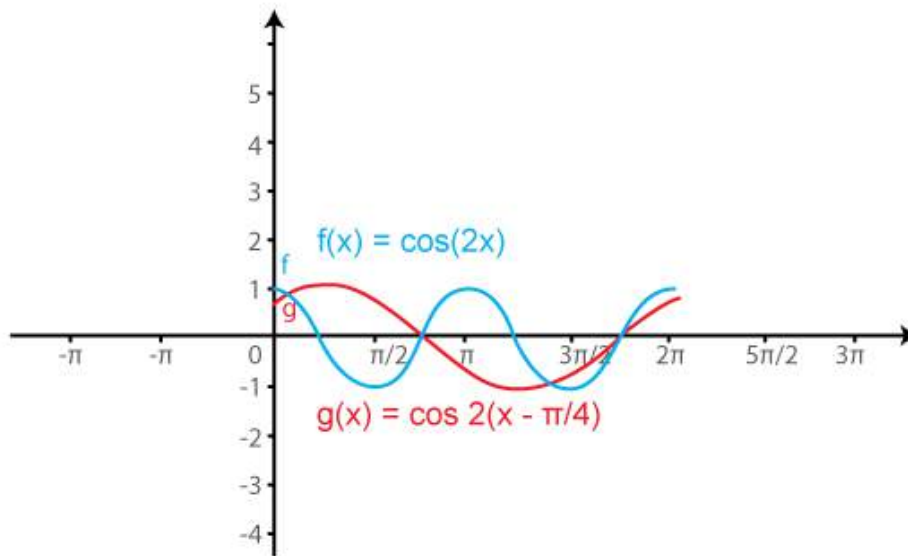
- (ii)  $y = \cos 2x$  and  $y = \cos 2(x - \pi/4)$

We know that the functions  $y = \cos 2x$  and  $y = \cos 2(x - \pi/4)$  are periodic functions with periods  $\pi$  and  $\pi$ .

The values of these functions are tabulated below:

x	0	$\pi/4$	$\pi/2$	$3\pi/4$	$\pi$	$5\pi/4$	$3\pi/2$	$7\pi/4$
$y = \cos x$	1	0	-1	0	1	0	-1	0
$y = \cos 2(x - \pi/4)$	0	1	0	-1	0	1	0	-1

The required curve is:



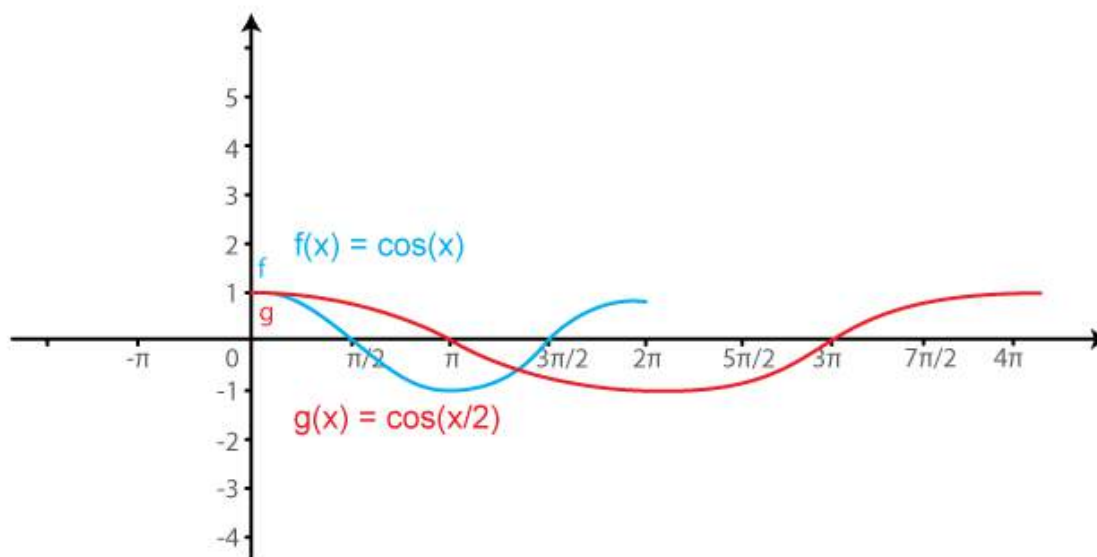
(iii)  $y = \cos x$  and  $y = \cos x/2$

We know that the functions  $y = \cos x$  and  $y = \cos (x/2)$  are periodic functions with periods  $\pi$  and  $\pi$ .

The values of these functions are tabulated below:

x	0	$\pi/2$	$\pi$	$3\pi/2$	$2\pi$
$y = \cos x$	1	0	-1	0	1
$y = \cos x/2$	1	$1/\sqrt{2} = 0.7$	0	$-1/\sqrt{2} = -0.7$	-1

The required curve is:



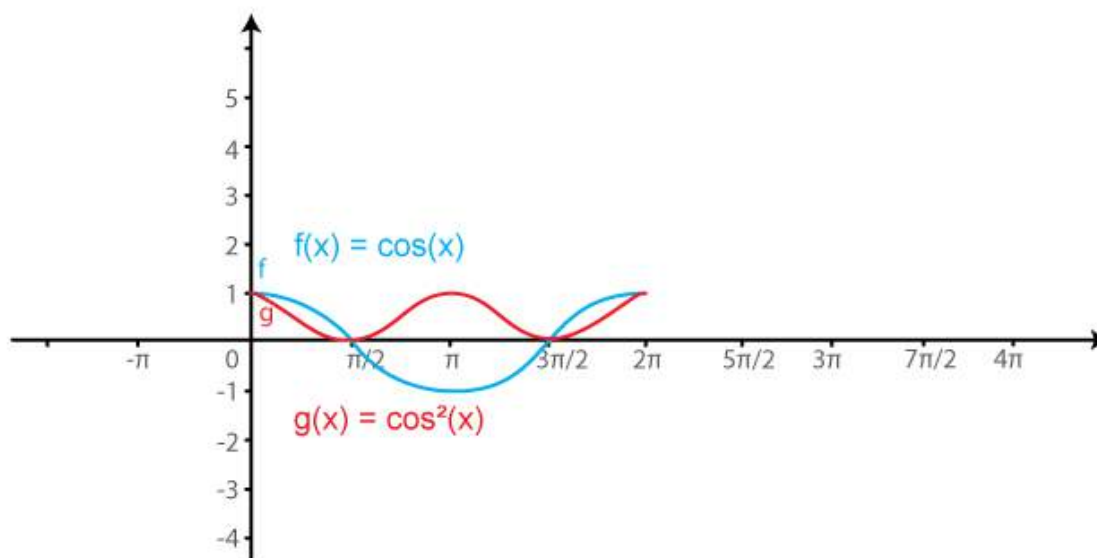
(iv)  $y = \cos^2 x$  and  $y = \cos x$

We know that the functions  $y = \cos^2 x$  and  $y = \cos x$  are periodic functions with period  $2\pi$ .

The values of these functions are tabulated below:

x	0	$\pi/2$	$\pi$	$3\pi/2$	$2\pi$
$y = \cos^2 x$	1	0	1	0	1
$y = \cos x$	1	0	-1	0	1

The required curve is:



### EXERCISE 6.3

PAGE NO: 6.13

**Sketch the graphs of the following functions:**

**1.  $f(x) = 2 \operatorname{cosec} \pi x$**

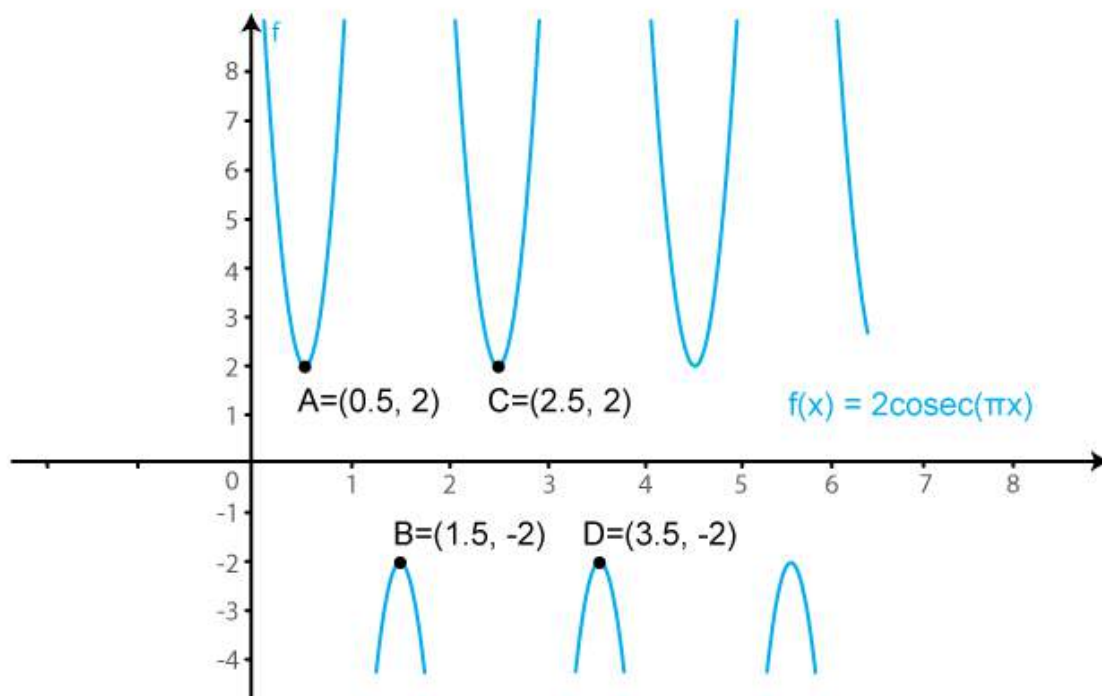
**Solution:**

We know that  $f(x) = \operatorname{cosec} x$  is a periodic function with period  $2\pi$ .

So,  $f(x) = 2 \operatorname{cosec} (\pi x)$  is a periodic function with period 2. So, we will draw the graph of  $f(x) = 2 \operatorname{cosec} (\pi x)$  in the interval  $[0, 2]$ . The values of  $f(x) = 2 \operatorname{cosec} (\pi x)$  at various points in  $[0, 2]$  are listed in the following table:

x	0 (A)	1/2 (B)	1 (C)	-1 (D)	3/2 (E)	-2 (F)	2 (G)	5/2 (H)
$f(x) = 2 \operatorname{cosec} (\pi x)$	$\infty$	2	$\infty$	$-\infty$	-2	$-\infty$	$\infty$	2

The required curve is:



**2.  $f(x) = 3 \sec x$**

**Solution:**

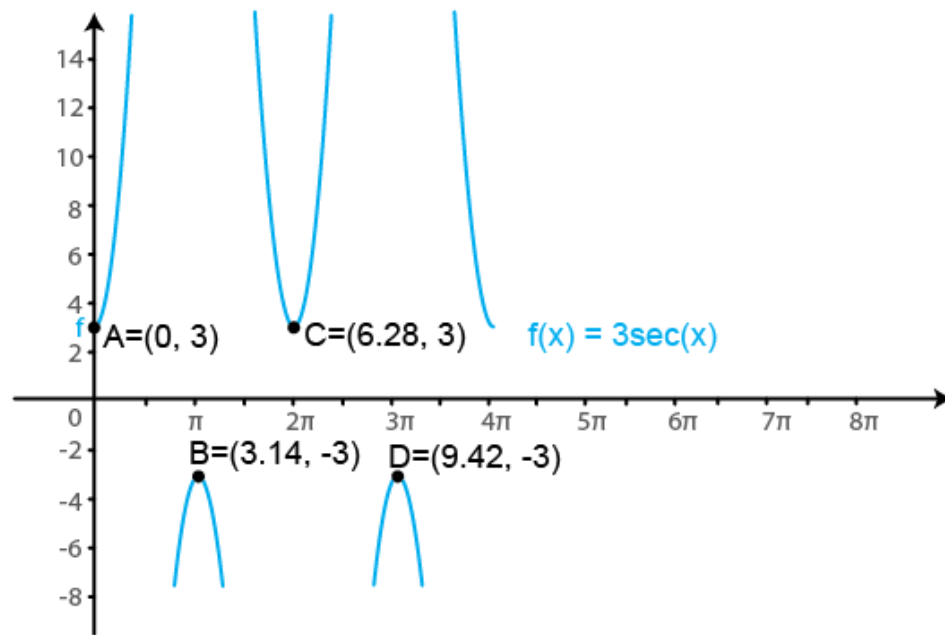
We know that  $f(x) = \sec x$  is a periodic function with period  $\pi$ .

So,  $f(x) = 3 \sec (x)$  is a periodic function with period  $\pi$ . So, we will draw the graph of  $f$

$f(x) = 3 \sec(x)$  in the interval  $[0, \pi]$ . The values of  $f(x) = 3 \sec(x)$  at various points in  $[0, \pi]$  are listed in the following table:

x	0 (A)	$\pi/2$ (B)	$-\pi/2$ (C)	$\pi$ (D)	$-3\pi/2$ (E)	$3\pi/2$ (F)	$2\pi$ (G)	$5\pi/2$ (H)
$f(x) = \sec x$	3	$\infty$	$-\infty$	-3	$-\infty$	$\infty$	3	$\infty$

The required curve is:



### 3. $f(x) = \cot 2x$

#### Solution:

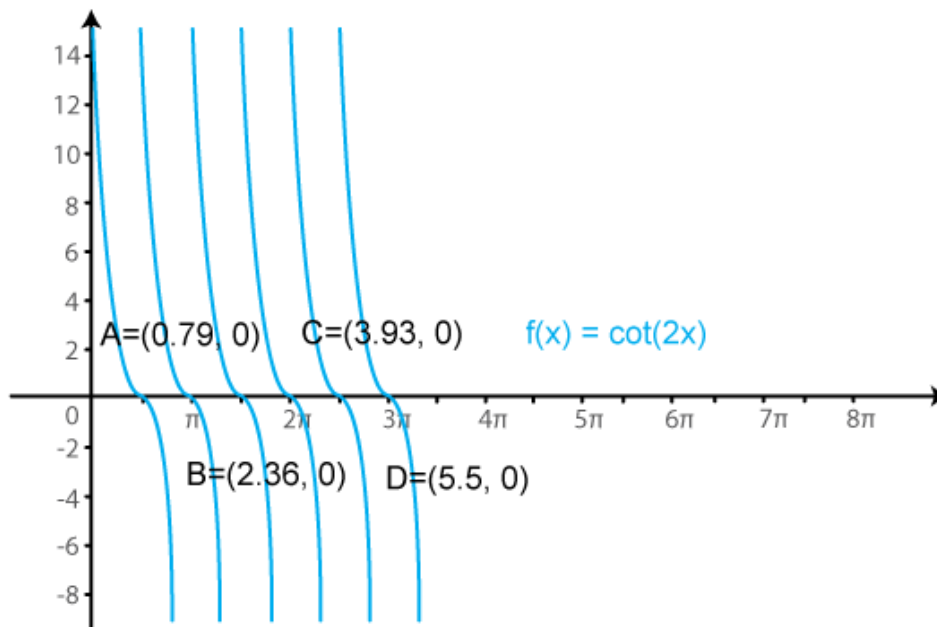
We know that  $f(x) = \cot x$  is a periodic function with period  $\pi$ .

So,  $f(x) = \cot(2x)$  is a periodic function with period  $\pi$ . So, we will draw the graph of  $f(x) = \cot(2x)$  in the interval  $[0, \pi]$ . The values of  $f(x) = \cot(2x)$  at various points in  $[0, \pi]$  are listed in the following table:

x	0 (A)	$\pi/4$ (B)	$-\pi/2$ (C)	$\pi/2$ (D)	$3\pi/4$ (E)	$-\pi$ (F)
$f(x) = \cot x$	$\rightarrow \infty$	0	$-\infty$	$\rightarrow \infty$	0	$-\infty$

The required curve is:





#### 4. $f(x) = 2 \sec \pi x$

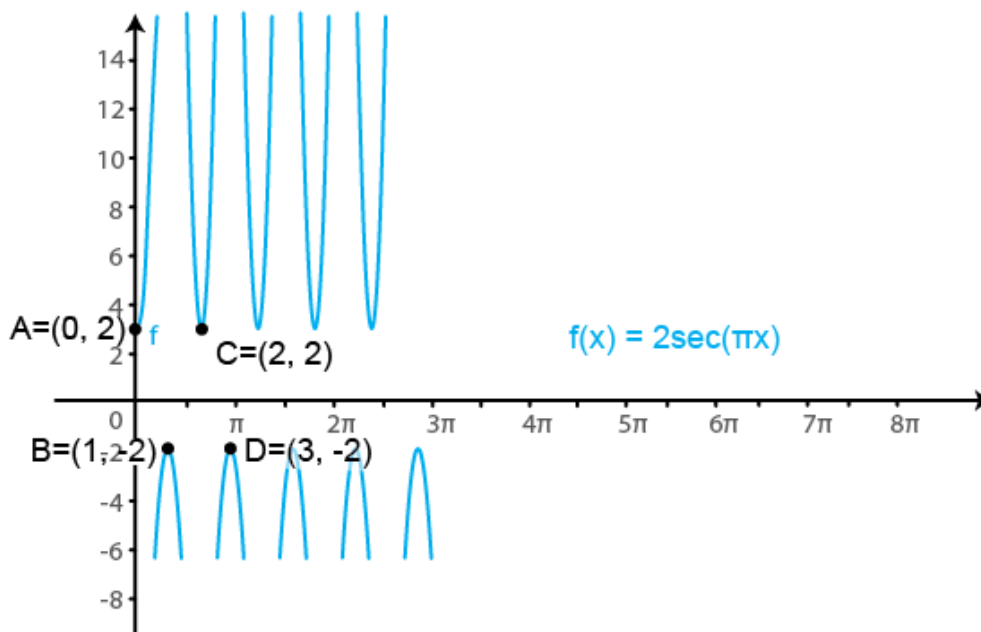
##### Solution:

We know that  $f(x) = \sec x$  is a periodic function with period  $\pi$ .

So,  $f(x) = 2 \sec(\pi x)$  is a periodic function with period 1. So, we will draw the graph of  $f(x) = 2 \sec(\pi x)$  in the interval  $[0, 1]$ . The values of  $f(x) = 2 \sec(\pi x)$  at various points in  $[0, 1]$  are listed in the following table:

$x$	0	$1/2$	$-1/2$	1	$-3/2$	$3/2$	2
$f(x) = 2 \sec(\pi x)$	2	$\infty$	$\rightarrow -\infty$	-2	$-\infty$	$\infty$	2

The required curve is:



### 5. $f(x) = \tan^2 x$

#### Solution:

We know that  $f(x) = \tan x$  is a periodic function with period  $\pi$ .

So,  $f(x) = \tan^2(x)$  is a periodic function with period  $\pi$ . So, we will draw the graph of  $f(x) = \tan^2(x)$  in the interval  $[0, \pi]$ . The values of  $f(x) = \tan^2(x)$  at various points in  $[0, \pi]$  are listed in the following table:

$x$	0 (A)	$\pi/2$ (B)	$\pi/2$ (C)	$\pi$ (D)	$3\pi/2$ (E)	$3\pi/2$ (F)	$2\pi$
$f(x) = \tan^2(x)$	0	$\infty$	$\rightarrow \infty$	0	$\infty$	$\rightarrow \infty$	0

The required curve is:

