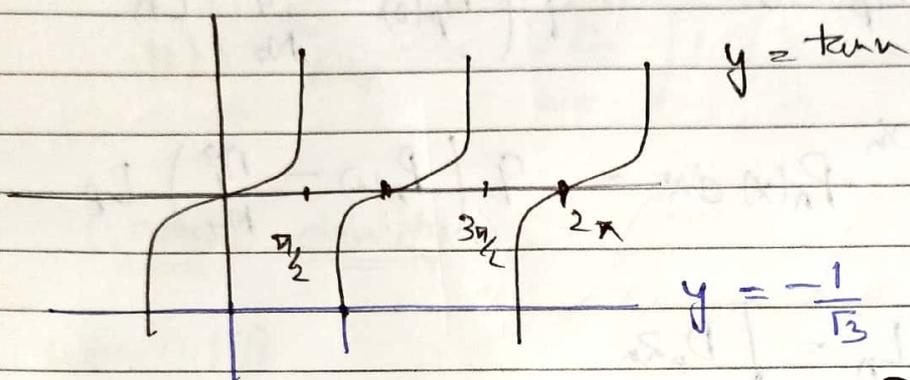Qu (4) (a) $\sqrt{3}\tan x + 1 = 0$

$\tan x = -\dfrac{1}{\sqrt{3}}$

taurking $y = \tan x$ & $y = \dfrac{-1}{\sqrt{3}}$

drawing graph of it. from $0 < x < 360$

from graph we are getting 2 No. of solution between $(0, 2\pi)$

ie

$x = \dfrac{\pi}{2} + \dfrac{\pi}{6}$, $\dfrac{3\pi}{2} + \dfrac{\pi}{6}$

$\boxed{x = \dfrac{4\pi}{6} , \dfrac{10\pi}{6}}$ Ans
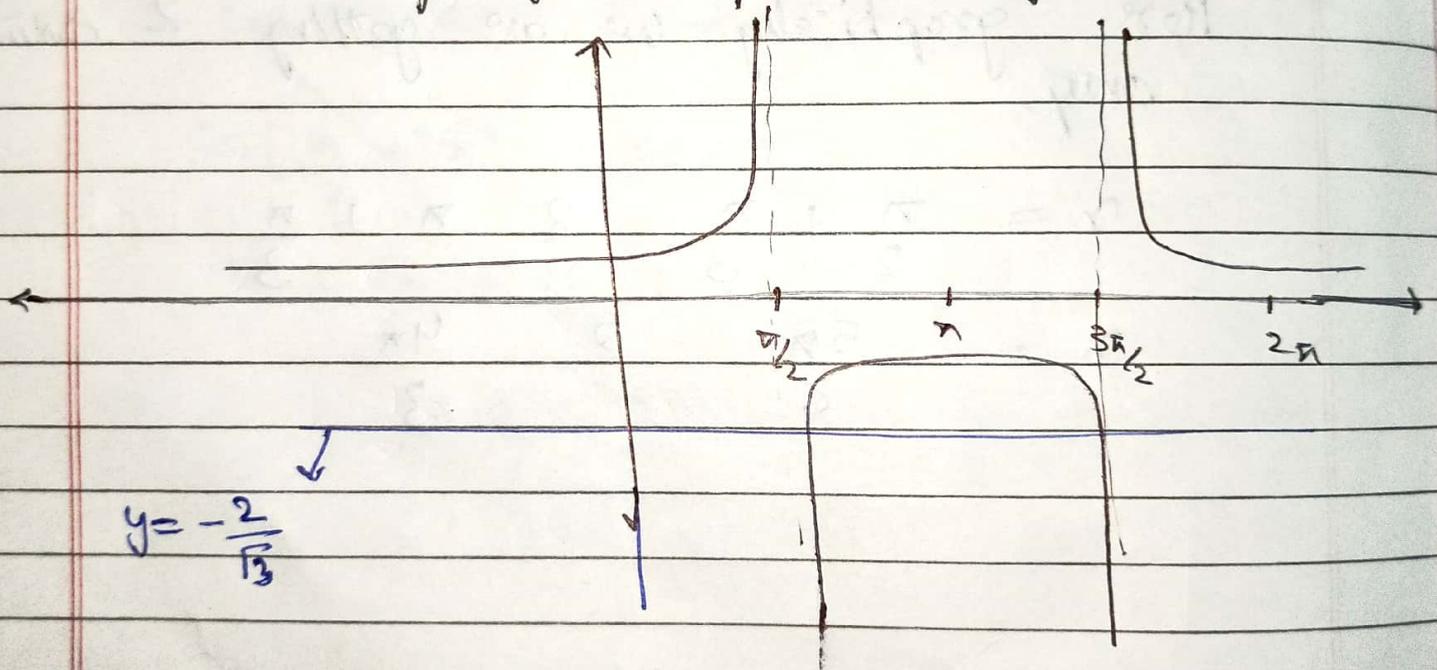
Now (b) $\sqrt{3} \sec x = -2$

$\sec x = \dfrac{-2}{\sqrt{3}}$

taking $y = \sec x$ & $y = \dfrac{-2}{\sqrt{3}}$

Now   drawing   graph   of $\sec x$ for $0 < x < 360°$

$y = -\dfrac{2}{\sqrt{3}}$

Here we getting 2 solution

$x = \dfrac{\pi}{6} + \dfrac{\pi}{2}$ & $\pi + \dfrac{\pi}{6}$ $= \boxed{\dfrac{4\pi}{6} \quad \& \quad \dfrac{7\pi}{6}}$

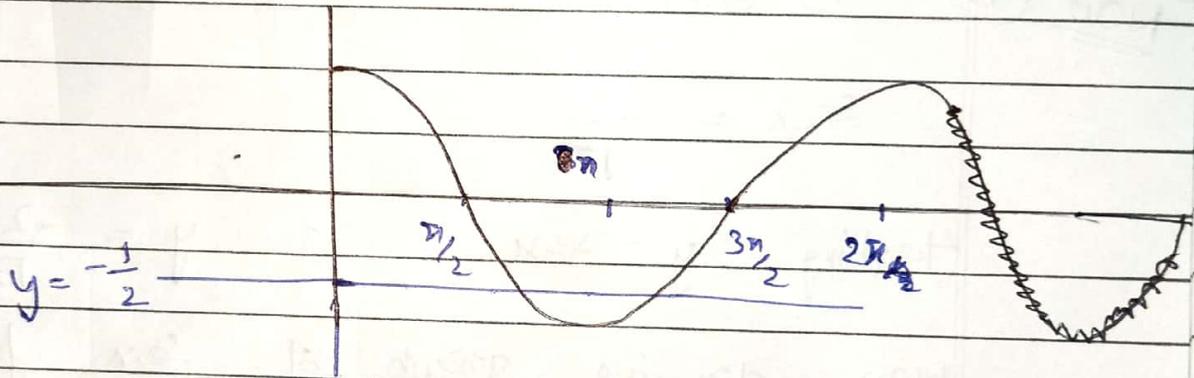$$n = \frac{4\pi}{6} \quad \& \quad \frac{7\pi}{6}$$

Que (4)

(c)

$$3\cos x = \cos x - 1$$

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

taking $\quad y = \cos x \quad \& \quad y = \frac{-1}{2}$

graph of $\quad y = \cos x \quad$ for $\quad 0 < x < 360°$

$$y = \frac{-1}{2}$$

here graphically we are getting 2 solution only,

$$n = \frac{\pi}{2} + \frac{\pi}{3} \quad \& \quad \pi + \frac{\pi}{3}$$
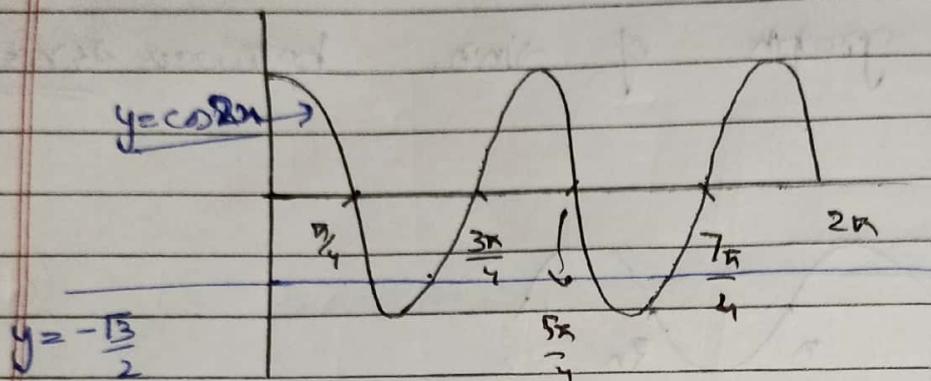
$$n = \frac{5\pi}{6} \quad \& \quad \frac{4\pi}{3}$$

⑤ ⓐ $\cos 2x = \dfrac{-\sqrt{3}}{2}$

taking $y = \cos 2x$ & $y = \dfrac{-\sqrt{3}}{2}$

drawing graph of $y = \cos 2x$, $0 < x < 2\pi$

$y = \cos 2x \rightarrow$

$y = \dfrac{-\sqrt{3}}{2}$

Graphically we are getting 4 solution.

now at $\cos 2x = -\dfrac{\sqrt{3}}{2}$

$- \cos 2x = \dfrac{\sqrt{3}}{2} = \cos\left(\dfrac{\pi}{6}\right)$

$\cos\left(\dfrac{\pi}{2} + 2x\right) = \cos\left(\dfrac{\pi}{6}\right)$

$\dfrac{\pi}{2} + 2x = \dfrac{\pi}{6}$

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

$x = \dfrac{\pi}{3}$, $\dfrac{7\pi}{12}$, $\dfrac{10\pi}{12}$, $\dfrac{13\pi}{12}$

we get

$x = \dfrac{\pi}{3}$, $\dfrac{\pi}{3} + \dfrac{\pi}{2}$, $\dfrac{\pi}{3} + \pi$, $\dfrac{\pi}{3} + \dfrac{3\pi}{2}$

$x = \dfrac{\pi}{3}$, $\dfrac{5\pi}{6}$, $\dfrac{4\pi}{3}$, $\dfrac{11\pi}{6}$

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Qu.(5) (b)

$$\csc^2 x + \csc x - 2 = 0$$

$$\csc x = \frac{-1 \pm \sqrt{1+8}}{2} \qquad \left(\text{Solving quadratic} \right)$$

$$\csc x = \frac{-1 \pm 3}{2}$$

(I) $\csc x = -2$ &   (II) $\csc x = 1$

Now   taking $\csc x = y$ & $y = -2$

$\csc x -$ graph $0 \leq x < 2\pi$
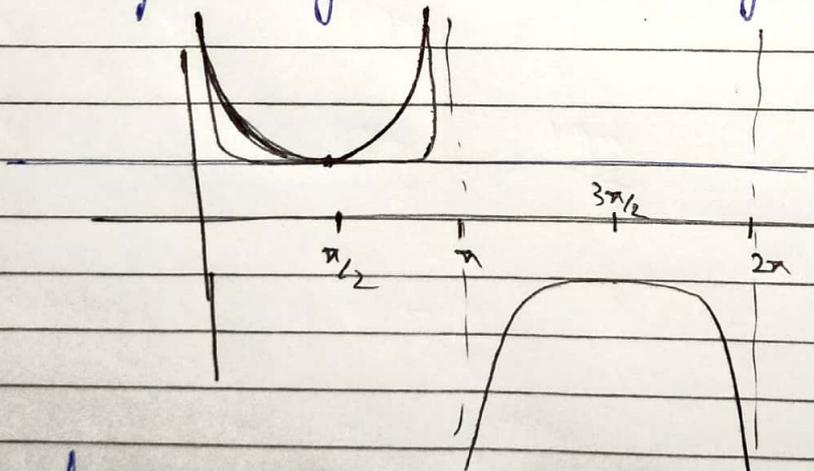
$y = \csc x \rightarrow$

$y = -2$
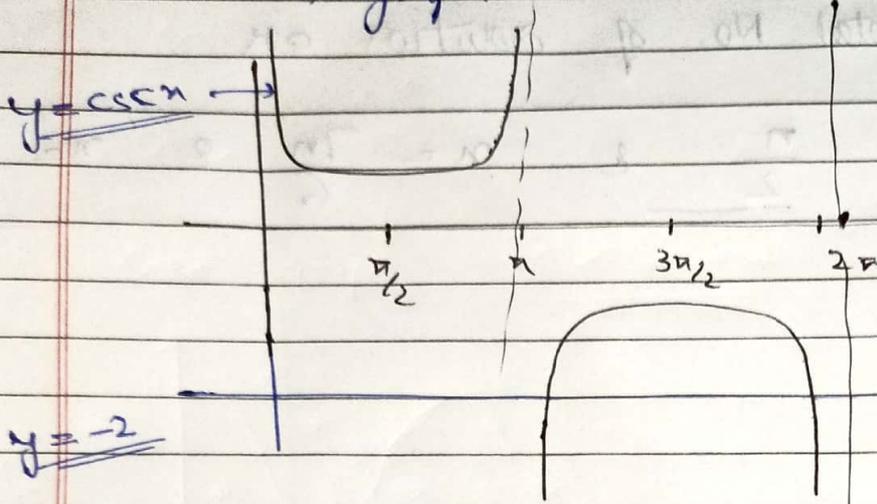
from graph we are getting 2 solution

$x = \pi + \dfrac{\pi}{6}$ & $2\pi - \dfrac{\pi}{6}$

$x = \dfrac{7\pi}{6}$ & $\dfrac{11\pi}{6}$

(II) taking $y = \csc x$ & $y = 1$

$\dfrac{3\pi}{2}$

$\dfrac{\pi}{2}$ π 2π

from graph we can clearly see, only 1 solution exist.
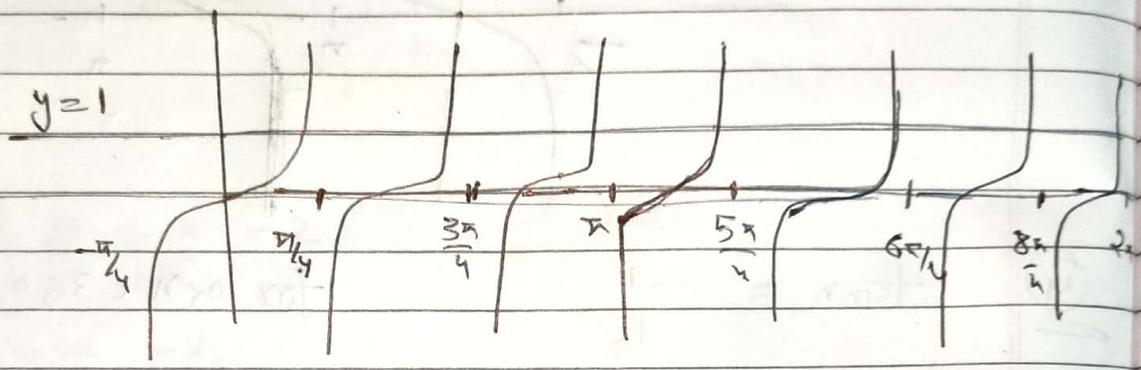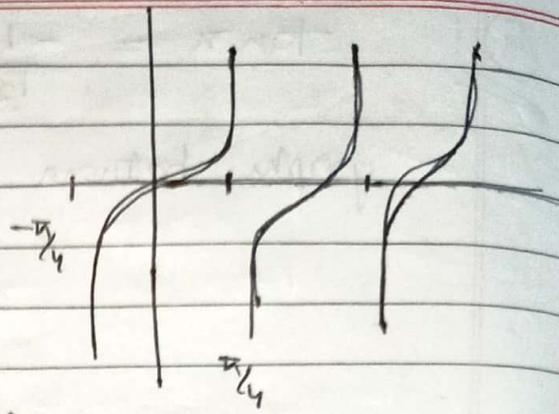
$x = \dfrac{\pi}{2}$

<u>So</u> total No. of solution are

$$x = \frac{\pi}{2} \quad \& \quad x = \frac{7\pi}{6} \quad \& \quad x = \frac{11\pi}{6}$$

Ⓒ $\tan 2x = 1$

$y = \tan 2x$

$y = 1$ $0 < x < 360$

$y = 1$

Here we are getting total 7 solution

at $x = \dfrac{\pi}{8}$, $\dfrac{\pi}{8} + \dfrac{\pi}{2}$, $\dfrac{\pi}{8} + \dfrac{2\pi}{2}$, $\dfrac{\pi}{8} + \dfrac{3\pi}{2}$

$\dfrac{\pi}{8} + \dfrac{4\pi}{2}$, $\dfrac{\pi}{8} + \dfrac{5\pi}{2}$, $\dfrac{\pi}{8} + \dfrac{6\pi}{2}$

ic

$x = \dfrac{\pi}{8}$, $\dfrac{5\pi}{8}$, $\dfrac{9\pi}{8}$, $\dfrac{13\pi}{8}$, $\dfrac{17\pi}{8}$
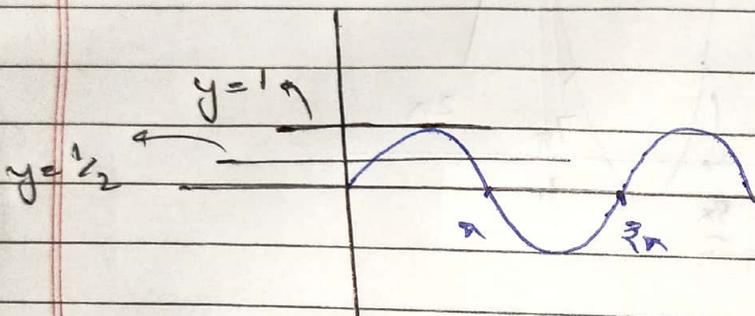
$\dfrac{21\pi}{8}$, $\dfrac{25\pi}{8}$

(d)

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

on solving we got

$$\sin x = 1 \quad \& \quad \sin x = \frac{1}{2}$$

drawing graph of $\sin x$, between $0 < x < 2\pi$

$y = 1$

$y = \frac{1}{2}$

π $\frac{3\pi}{2}$

Now for $\sin x = 1$

we are getting only 1 solution

$$\boxed{x = \frac{\pi}{2}}$$

Now $\sin x = \frac{1}{2}$

we are getting only 2 solution in between $(0, 2\pi)$

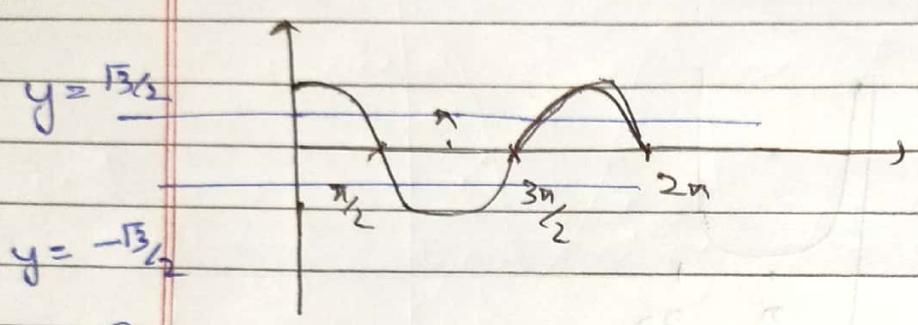$$x = \frac{\pi}{6} \quad , \quad \frac{\pi}{2} + \frac{\pi}{6}$$

$$\boxed{x = \frac{\pi}{6} \quad \& \quad \frac{4\pi}{6}}$$

(e) $4\cos^2 x = 3$

$\cos^2 x = \dfrac{3}{4}$

(1) $\cos x = \dfrac{\sqrt{3}}{2}$ & (2) $\cos x = \dfrac{-\sqrt{3}}{2}$

__Cosx graph__ $\quad 0 < x < 2\pi$

$y = \dfrac{\sqrt{3}}{2}$

$y = \dfrac{-\sqrt{3}}{2}$

(I) taking $\quad y = \dfrac{\sqrt{3}}{2}$ & $y = \cos x$

we are getting 3 solution at

$x = \dfrac{\pi}{6}, \quad \dfrac{\pi}{6} + \dfrac{3\pi}{2}, \quad \dfrac{-\pi}{6} + \dfrac{2\pi}{2}$

$x = \dfrac{\pi}{6}, \quad \dfrac{19\pi}{6}, \quad \dfrac{11\pi}{6}$

$\boxed{x = \dfrac{\pi}{6}, \quad \dfrac{10\pi}{3.}, \quad \dfrac{11\pi}{6}}$

(II) taking $\quad y = \dfrac{-\sqrt{3}}{2}$ & $y = \cos x$

from graph we are getting 2 solution only

$x = \dfrac{\pi}{2} + \dfrac{\pi}{6}, \quad \pi + \dfrac{\pi}{6}$

$\boxed{x = \dfrac{2\pi}{3}, \quad \dfrac{7\pi}{6}}$

Que ⑤

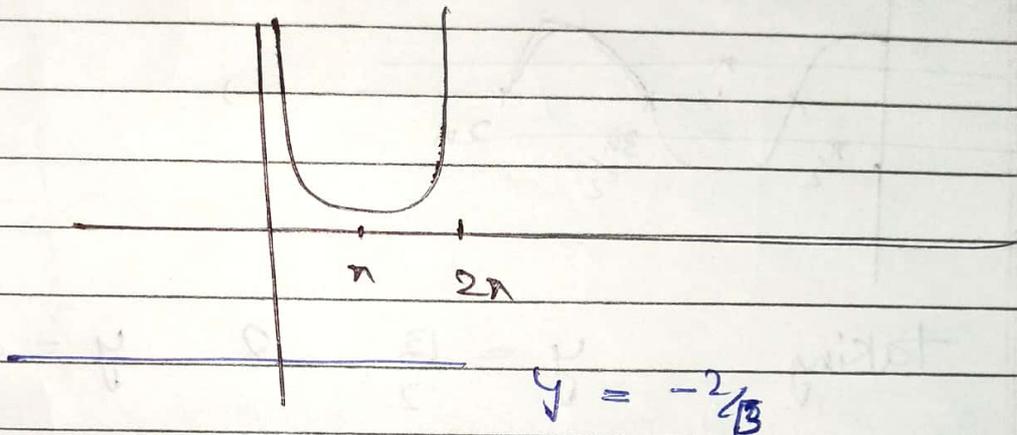④　　csc $\dfrac{x}{2} = \dfrac{-2}{\sqrt{3}}$

$y = \cos\left(\dfrac{x}{2}\right)$　&　$y = \dfrac{-2}{\sqrt{3}}$

$0 < x < 2\pi$

drawing graph

x　　2π

$y = -\dfrac{2}{\sqrt{3}}$

from graph we can clearly do
no solution for this question