Q for what values of 'K'

$$\sin x + \underbrace{\cos(K+x) + \cos(K-x)} = 2$$

has real solution.

$$\sin x + 2\cos K \cos x = 2$$

$$a\sin x + b\cos x = c$$

$$a = 1 \quad b = 2\cos K \quad c = 2$$

$$\sqrt{a^2+b^2} = \sqrt{1+4\cos^2 K}$$

$$|c| \le \sqrt{a^2+b^2}$$

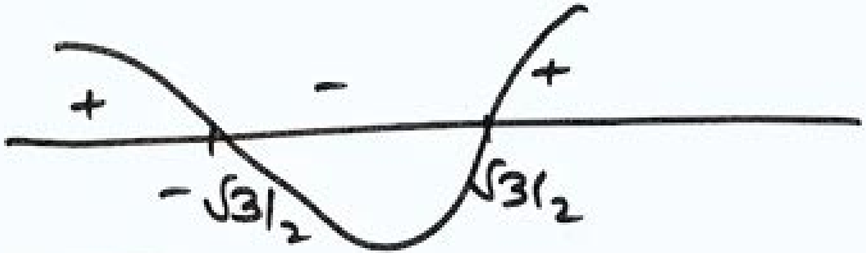
$$2 \le \sqrt{1+4\cos^2 K}$$

$$\sqrt{1+4\cos^2 x} \ge 2$$

$$1+4\cos^2 x \ge 4$$

$$4\cos^2 x - 3 \ge 0$$

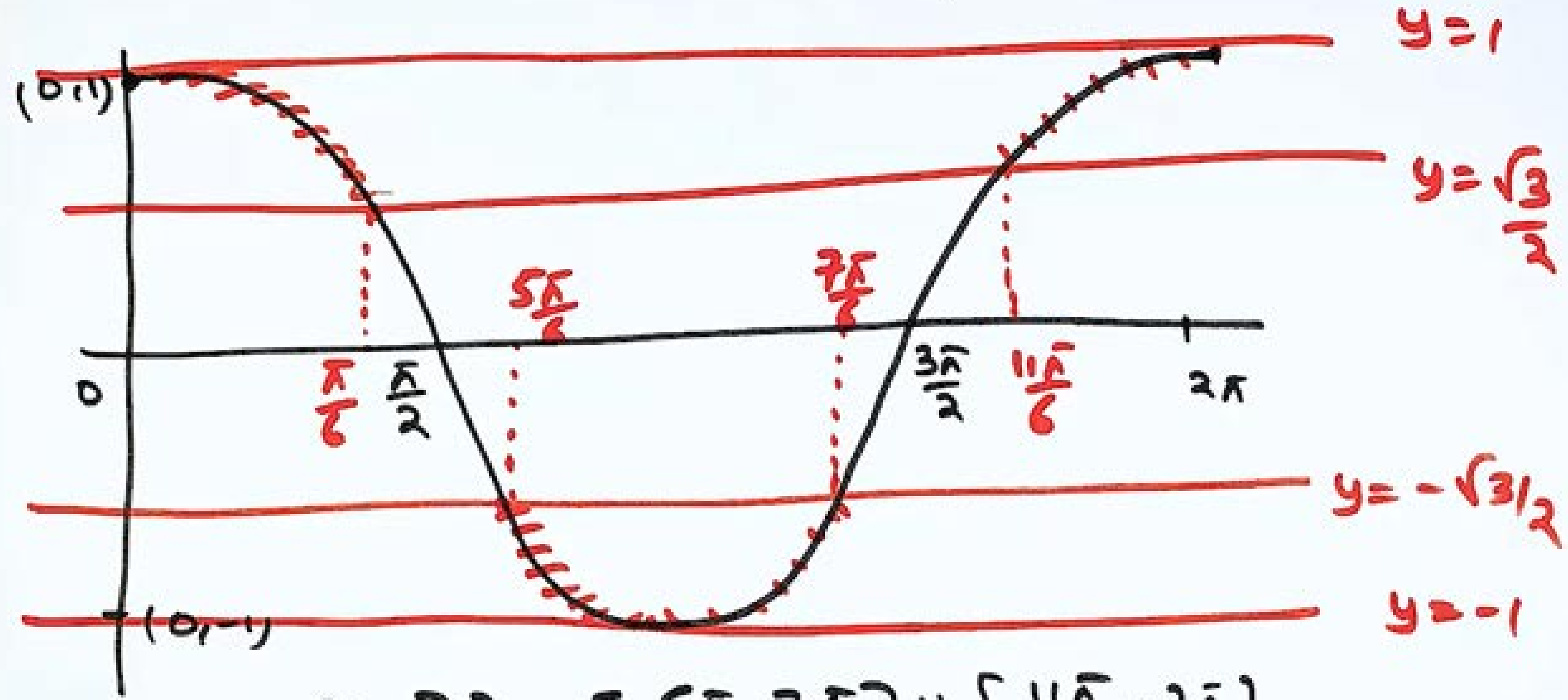
$$(2\cos x+\sqrt{3})(2\cos x-\sqrt{3}) \ge 0$$



$$\frac{\sqrt{3}}{2} \le \cos x \le 1$$

$$-1 \le \cos x \le -\sqrt{3}/2$$

(i) $-1 \le \cos K \le -\sqrt{3}/2$ (ii) $\frac{\sqrt{3}}{2} \le \cos K \le 1$



$$\left[0, \frac{\pi}{6}\right] \cup \left[\frac{5\pi}{6}, \frac{7\pi}{6}\right] \cup \left[\frac{11\pi}{6}, 2\pi\right]$$

$$K \in \left[0, \frac{\pi}{6}\right] \cup \left[\frac{5\pi}{6}, \frac{7\pi}{6}\right] \cup \left[\frac{11\pi}{6}, 2\pi\right]$$

$$\boxed{K \in \left[2n\pi, 2n\pi + \frac{\pi}{6}\right] \cup \left[2n\pi + \frac{5\pi}{6}, 2n\pi + \frac{7\pi}{6}\right] \cup \left[2n\pi + \frac{11\pi}{6}, 2n\pi + 2\pi\right], \quad n \in I}$$

Q $\sqrt{16\cos^4 x - 8\cos^2 x + 1} + \sqrt{16\cos^4 x - 24\cos^2 x + 9} = 2$

Good

$(4\cos^2 x - 1)^2 \qquad (4\cos^2 x - 3)^2$

$\sqrt{x^2} = |x|$

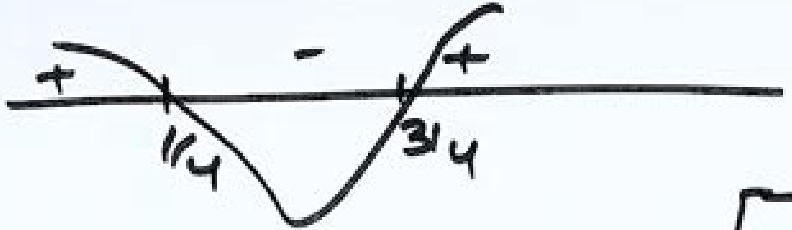
$|4\cos^2 x - 1| + |4\cos^2 x - 3| = 2$

$a = 4\cos^2 x - 1 \qquad b = 4\cos^2 x - 3$

$|a| + |b| = |a - b|$

$\underline{\underline{ab \le 0}}$

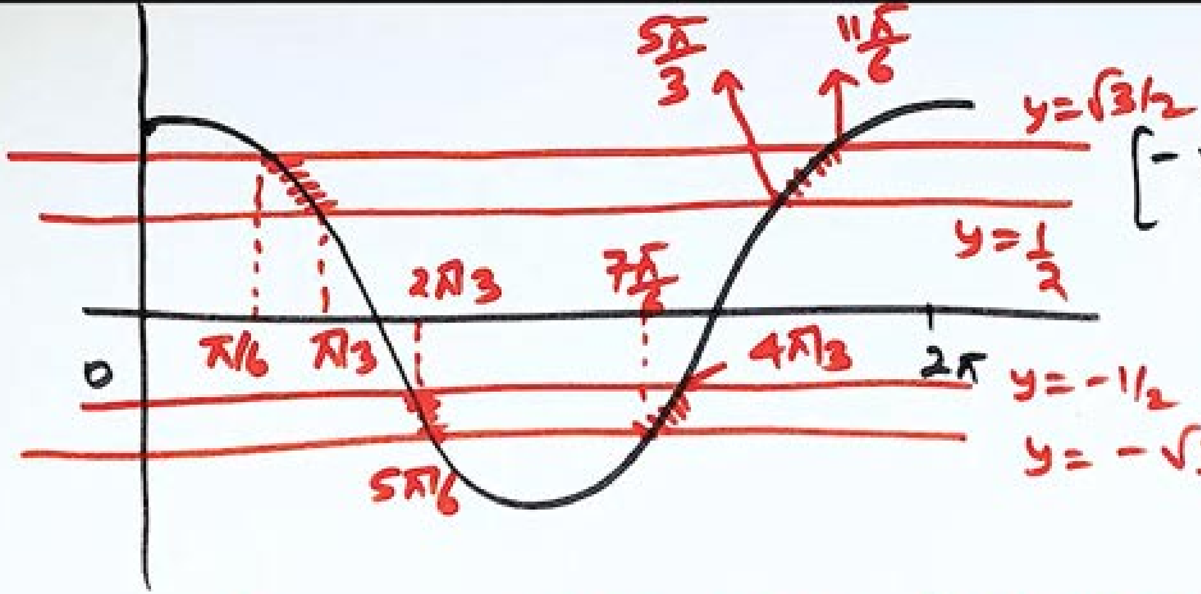
$$(4\cos^2 x - 1)(4\cos^2 x - 3) \le 0$$



$$\frac{1}{4} \le \cos^2 x \le 3/4$$

$$\cos x \in \left[-\frac{\sqrt{3}}{2}, -\frac{1}{2}\right] \cup \left[\frac{1}{2}, \frac{\sqrt{3}}{2}\right]$$

$$\boxed{\begin{array}{c} a^2 \le x^2 \le b^2 \\ x \in [-b, -a] \cup [a, b] \\ a, b > 0 \end{array}}$$



$\left[-\frac{\sqrt{3}}{2}, -\frac{1}{2}\right] \cup$

$\left[\frac{1}{2}, \sqrt{3}/2\right]$

$x \in \left[\frac{\pi}{6}, \pi/3\right] \cup \left[\frac{2\pi}{3}, \frac{5\pi}{6}\right] \cup \left[\frac{7\pi}{6}, 4\pi/3\right] \cup \left[\frac{5\pi}{3}, \frac{11\pi}{6}\right]$

$x \in \left[2n\pi + \frac{\pi}{6}, 2n\pi + \frac{\pi}{3}\right] \cup \left[2n\pi + \frac{2\pi}{3}, 2n\pi + \frac{5\pi}{6}\right] \cup$

$\left[2n\pi + \frac{7\pi}{6}, 2n\pi + \frac{4\pi}{3}\right] \cup \left[2n\pi + \frac{5\pi}{3}, 2n\pi + \frac{11\pi}{6}\right]$ $n \in I$

Q1 $\sin x = \frac{1}{2}$ or $\cos x = \frac{1}{\sqrt{2}}$

$x = n\pi + (-1)^n \frac{\pi}{6}$ or $x = 2n\pi \pm \frac{\pi}{4}$

$n \in I$ $\quad$ $n \in I$

Q2 $\sin x = \frac{1}{2}$ and $\tan x = \frac{1}{\sqrt{3}}$

1st, 3rd q

$\frac{\pi}{6}$ $\frac{5\pi}{6}$ $\frac{\pi}{6}$, $\frac{7\pi}{6}$

$\frac{\pi}{6}$

Add $2n\pi$

$2n\pi + \frac{\pi}{6}$ $n \in I$

Q3 $\sin x = \frac{1}{\sqrt{2}}$ and $\tan x = \sqrt{3}$

$\frac{\pi}{4}, \frac{3\pi}{4}$ $\qquad$ $\frac{\pi}{3}, \frac{4\pi}{3}$

No common solution

$x \in \phi$ no solution

Q4 $\sin x = \frac{1}{\sqrt{2}}$ and $\cos x = \frac{1}{\sqrt{2}}$

$\frac{\pi}{4}, \frac{3\pi}{4}$

$\frac{\pi}{4}, 2\pi - \frac{\pi}{4}$

$\frac{7\pi}{4}$

$\pi/4$

$2n\pi + \pi/4 \quad n \in I$

TYPE #7 BY SQUARING

Q $\sqrt{1-\cos x} = \sin x$

$\sin x \geq 0$

$x = -2$ ✓
$x^2 = 4$
$x = \pm 2$ ✓
wrong.

$1-\cos x = \sin^2 x$

$1-\cancel{\cos x} = 1-\cos^2 x$

$= (1+\cos x)(1-\cancel{\cos x})$

$1-\cos x = 0$
$\cos x = 1$

$x = 2n\pi$

$1 = \quad 1+\cos x$

$\cos x = 0 \longrightarrow \quad \sin x = 1, -1$

$x = (2n-1)\frac{\pi}{2} \qquad \sin x \geq 0$

wrong.

$[0, 2\pi] \qquad \underline{\cos x} = 0 \longrightarrow \frac{\pi}{2} \checkmark \quad \frac{3\pi}{2}$

$\sin x = -1$

$x = 2n\pi + \frac{\pi}{2} \qquad n \in \underline{I}$

Q $\sqrt{3\sin 5x - \cos^2 x - 3} = \underbrace{1-\sin x}_{\geq 0}$

$3\sin 5x - \cos^2 x - 3 = (1-\sin x)^2$

$= 1 + \sin^2 x - 2\sin x$

$3\sin 5x - \cos^2 x - \sin^2 x + 2\sin x = 4$

$3\sin 5x + 2\sin x - [\underbrace{\cos^2 x + \sin^2 x}_{1}] = 4$

$3\sin 5x + 2\sin x = 5$

$\sin 5x = 1$ & $\sin x = 1$

$x = 2n\pi + \frac{\pi}{2}$

$\sin 5x = 16\sin^5 x - 20\sin^3 x + 5\sin x$

if $\sin x = 1 \Rightarrow \sin 5x = 1$

$x = 2n\pi + \frac{\pi}{2}$ $\quad n \in I$

HOMEWORK CLASS # 3.

BB # 7	3, 4, 6, 7
BB # 8	1, 2, 3, 4, 5, 6, 7
BB # 5	3, 4
BB # 6	6, 8
Ex # 1	25, 26, 28
Ex # 3	8
Ex # 4B	12, 14, 15
Ex # 5	6, 7, 8, 10

WORKSHEET # 3