LE EQUAZIONI E LE DISEQUAZIONI GONIOMETRICHE

ESERCIZI

1. LE EQUAZIONI GONIOMETRICHE ELEMENTARI

Verifica le seguenti identità.

1 A $\left(\operatorname{sen}\alpha+1\right)^2+\cos\alpha\left(\cos\alpha+2\operatorname{sen}\alpha\right)=2\operatorname{sen}\alpha\left(\cos\alpha+1\right)+2$

1 B $\left(\cos\alpha+1\right)^2+\operatorname{sen}\alpha\left(\cos\alpha+\operatorname{sen}\alpha\right)=\cos\alpha\left(\operatorname{sen}\alpha+2\right)+2$

2 A $\dfrac{\cos^2\left(180°-\alpha\right)-\operatorname{sen}^2\left(180°-\alpha\right)}{\operatorname{sen}\left(180°-\alpha\right)+\cos\left(180°+\alpha\right)}+\cos\left(-\alpha\right)=-\operatorname{sen}\left(180°-\alpha\right)$

2 B $\dfrac{\operatorname{sen}^2\left(180°+\alpha\right)-\cos^2\left(180°+\alpha\right)}{\operatorname{sen}\left(180°-\alpha\right)+\cos\left(180°+\alpha\right)}-\operatorname{sen}\left(90°-\alpha\right)=\operatorname{sen}\left(180°-\alpha\right)$

3 A $\dfrac{\operatorname{tg}\alpha}{\operatorname{sen}2\alpha}+\dfrac{\operatorname{tg}^2\alpha}{1-\cos2\alpha}=\sec^2\alpha$

3 B $\dfrac{1}{\operatorname{cotg}\alpha\operatorname{sen}2\alpha}=\dfrac{\operatorname{tg}^2\alpha}{\cos2\alpha-1}+\sec^2\alpha$

4 A $\dfrac{2\left(1-\operatorname{sen}^2\alpha\right)\operatorname{tg}\alpha}{\operatorname{sen}2\alpha}=\operatorname{sen}^2\alpha+\dfrac{1}{\sec^2\alpha}$

4 B $\dfrac{2\left(1-\cos^2\alpha\right)\cdot\operatorname{cotg}\alpha}{\operatorname{sen}2\alpha}=\cos^2\alpha+\dfrac{1}{\operatorname{cosec}^2\alpha}$

5 A $\operatorname{sen}\left(\dfrac{\pi}{3}+\alpha\right)\cdot\operatorname{sen}\left(\dfrac{\pi}{6}+\alpha\right)-\dfrac{\sqrt{3}}{4}=\dfrac{1}{2}\operatorname{sen}2\alpha$

5 B $\cos\left(\dfrac{\pi}{3}-\alpha\right)\cdot\cos\left(\dfrac{\pi}{6}-\alpha\right)-\dfrac{\sqrt{3}}{4}=\dfrac{1}{2}\operatorname{sen}2\alpha$

6 A $2\operatorname{sen}^2\dfrac{\alpha}{2}+\operatorname{sen}\alpha\cdot\operatorname{cotg}\alpha=1$

6 B $2\cos^2\dfrac{\alpha}{2}+\operatorname{sen}\alpha\cdot\operatorname{cotg}\alpha=1$

Risolvi le seguenti equazioni goniometriche elementari.

7 A $\operatorname{sen} x+\cos x=\dfrac{1+2\cos x}{2}$ $\left[x=\dfrac{\pi}{6}+2k\pi;\ x=\dfrac{5}{6}\pi+2k\pi,\ k\in\mathbf{Z}\right]$

7 B $\operatorname{sen} x+\cos x=\dfrac{2\operatorname{sen} x-1}{2}$ $\left[x=\pm\dfrac{4}{3}\pi+2k\pi,\ k\in\mathbf{Z}\right]$

8 A $\operatorname{sen} x+\cos x-\dfrac{1}{2}=\dfrac{5+2\operatorname{sen} x}{2}$ [impossibile]

8 B $\operatorname{sen} x-\dfrac{1}{2}=\dfrac{7+2\operatorname{sen} x}{2}+\cos x$ [impossibile]

9 A $4\operatorname{sen}\left(x+\dfrac{2}{9}\pi\right)=4+3\left[\operatorname{sen}\left(x+\dfrac{2}{9}\pi\right)-1\right]$ $\left[x=\dfrac{5}{18}\pi+2k\pi,\ k\in\mathbf{Z}\right]$

9 B $6\cos\left(x+\dfrac{\pi}{9}\right)=6+5\left[\cos\left(x+\dfrac{\pi}{9}\right)-1\right]$ $\left[x=-\dfrac{\pi}{9}+2k\pi,\ k\in\mathbf{Z}\right]$

10 A $\sqrt{2}\cos x-\operatorname{sen} x=1+\cos(90°+x)$ $\left[x=\pm 45°+k360°,\ k\in\mathbf{Z}\right]$

10 B $\sqrt{2}\operatorname{sen} x-\cos x=1-\operatorname{sen}(90°+x)$ $\left[x=45°+k360°;\ x=135°+k360°,\ k\in\mathbf{Z}\right]$

11 A $\dfrac{7+2\operatorname{sen} 3x}{2}=2\operatorname{sen} 3x+3$ $\left[x=10°+k120°;\ x=50°+k120°,\ k\in\mathbf{Z}\right]$

11 B $\dfrac{11+2\cos 4x}{2}=2\cos 4x+5$ $\left[x=\pm 15°+k90°,\ k\in\mathbf{Z}\right]$

12 A $\dfrac{3}{2}\operatorname{tg}^2\dfrac{\pi}{4}\cdot\operatorname{sen}\left(2x-\dfrac{\pi}{3}\right)=\operatorname{cotg}\dfrac{5}{6}\pi-\dfrac{1}{2}\operatorname{sen}\left(2x-\dfrac{\pi}{3}\right)$ $\left[x=\dfrac{5}{6}\pi+k\pi;\ x=\pi+k\pi,\ k\in\mathbf{Z}\right]$

12 B $2\operatorname{tg}^2\dfrac{\pi}{3}\cdot\operatorname{sen}\left(\dfrac{x}{4}-\dfrac{\pi}{8}\right)=\dfrac{13}{4}\sqrt{2}\operatorname{cotg}\dfrac{\pi}{4}-\dfrac{1}{2}\operatorname{sen}\left(\dfrac{x}{4}-\dfrac{\pi}{8}\right)$ $\left[x=\dfrac{3}{2}\pi+8k\pi;\ x=\dfrac{7}{2}\pi+8k\pi,\ k\in\mathbf{Z}\right]$

13 A $\cos\left(\dfrac{x}{3}+\dfrac{\pi}{3}+\dfrac{\pi}{4}\right)+\operatorname{sen}\left(\dfrac{x}{3}+\dfrac{\pi}{3}+\dfrac{\pi}{4}\right)=\operatorname{tg}\dfrac{\pi}{4}$ $\left[x=-\dfrac{7}{4}\pi+6k\pi;\ x=-\dfrac{\pi}{4}+6k\pi,\ k\in\mathbf{Z}\right]$

13 B $\cos\left(\dfrac{x}{2}+\dfrac{\pi}{3}-\dfrac{\pi}{4}\right)-\operatorname{sen}\left(\dfrac{x}{2}+\dfrac{\pi}{3}-\dfrac{\pi}{4}\right)=\operatorname{tg}\dfrac{\pi}{4}$ $\left[x=-\dfrac{7}{6}\pi+4k\pi;\ x=-\dfrac{\pi}{6}+4k\pi,\ k\in\mathbf{Z}\right]$

14 A $\dfrac{\operatorname{tg} x+\operatorname{tg} 45°}{5}=\operatorname{sen} 90°-\dfrac{4}{5}$ $\left[x=k180°,\ k\in\mathbf{Z}\right]$

14 B $\dfrac{\operatorname{tg} x+\cos 0°}{4}=\operatorname{tg} 45°-\dfrac{3}{4}$ $\left[x=k180°,\ k\in\mathbf{Z}\right]$

15 A $\dfrac{\operatorname{tg} x+2}{2}=2\operatorname{sen}\dfrac{\pi}{3}+\dfrac{2-\operatorname{tg} x}{2}$ $\left[x=\dfrac{\pi}{3}+k\pi,\ k\in\mathbf{Z}\right]$

15 B $\dfrac{\operatorname{tg} x+3}{3}=1-2\cos\dfrac{\pi}{6}-\dfrac{2\operatorname{tg} x}{3}$ $\left[x=-\dfrac{\pi}{3}+k\pi,\ k\in\mathbf{Z}\right]$

16 A $2\operatorname{tg} 3x+5=4+\operatorname{tg} 3x$ $\left[x=-\dfrac{\pi}{12}+k\dfrac{\pi}{3},\ k\in\mathbf{Z}\right]$

16 B $3\operatorname{tg} 5x+2=3+2\operatorname{tg} 5x$ $\left[x=\dfrac{\pi}{20}+k\dfrac{\pi}{5},\ k\in\mathbf{Z}\right]$

17 A $2\operatorname{tg} 4x=\dfrac{\operatorname{sen}\dfrac{15}{2}\pi}{\operatorname{tg}\left(\dfrac{\pi}{2}-4x\right)}+2\cos\dfrac{\pi}{6}$ $\left[x=\dfrac{\pi}{24}+k\dfrac{\pi}{4},\ k\in\mathbf{Z}\right]$

17 B $\dfrac{4}{\operatorname{tg}\left(6x-\dfrac{\pi}{2}\right)}=\dfrac{\cos(-13\pi)}{\operatorname{cotg} 6x}+\operatorname{tg}\left(\dfrac{\pi}{3}+4\pi\right)$ $\left[x=-\dfrac{\pi}{36}+k\dfrac{\pi}{6},\ k\in\mathbf{Z}\right]$

18 A $\operatorname{sen}\left(4x+\dfrac{\pi}{3}\right)=-\operatorname{sen}\left(2x-\dfrac{5}{3}\pi\right)$ $\left[x=\dfrac{2}{9}\pi+k\dfrac{\pi}{3};\ x=-\dfrac{\pi}{2}+k\pi,\ k\in\mathbf{Z}\right]$

18 B $-\operatorname{sen}\left(3x-\dfrac{\pi}{4}\right)=\operatorname{sen}\left(\dfrac{7}{4}\pi-5x\right)$ $\left[x=\dfrac{\pi}{8}+k\dfrac{\pi}{4};\ x=\dfrac{3}{4}\pi+k\pi,\ k\in\mathbf{Z}\right]$

19 A $\cos\left(2x-\dfrac{\pi}{3}\right)=-\cos\left(3x+\dfrac{\pi}{3}\right)$ $\left[x=\dfrac{\pi}{5}+\dfrac{2}{5}k\pi;\ x=\dfrac{\pi}{3}+2k\pi,\ k\in\mathbf{Z}\right]$

19 B $-\cos\left(\dfrac{\pi}{6}-2x\right)=\cos\left(x+\dfrac{5}{6}\pi\right)$ $\left[x=2k\pi;\ x=\dfrac{\pi}{9}+\dfrac{2}{3}k\pi,\ k\in\mathbf{Z}\right]$

20 A $\operatorname{tg}\left(3x+\dfrac{2}{3}\pi\right)=\left|\operatorname{tg}\left(-4x-\dfrac{4}{3}\pi\right)\right|$ $\left[x=-\dfrac{2}{7}\pi+k\dfrac{\pi}{7};\ x=-\dfrac{2}{3}\pi+k\pi,\ k\in\mathbf{Z}\right]$

20 B $\operatorname{tg}\left(-3x+\dfrac{\pi}{5}\right)=\left|\operatorname{tg}\left(2x+\dfrac{6}{5}\pi\right)\right|$ $\left[x=-\dfrac{\pi}{5}+k\dfrac{\pi}{5};\ x=\dfrac{7}{5}\pi+k\pi,\ k\in\mathbf{Z}\right]$

Risolvi le seguenti equazioni riducibili a equazioni elementari.

21 A $2-2\cos^2 x+\operatorname{sen} 2x=0$ $\left[x=\dfrac{3}{4}\pi+k\pi;\ x=k\pi,\ k\in\mathbf{Z}\right]$

21 B $\cos^2 x-\cos 2x+\operatorname{sen} x\cos x=0$ $\left[x=\dfrac{3}{4}\pi+k\pi;\ x=k\pi,\ k\in\mathbf{Z}\right]$

22 A $3\operatorname{tg}^2\dfrac{x}{2}+2\cos x=2$ $\left[x=\pm\dfrac{\pi}{3}+2k\pi;\ x=2k\pi,\ k\in\mathbf{Z}\right]$

22 B $\operatorname{tg}^2\dfrac{x}{2}+2\cos x=2$ $\left[x=\dfrac{2}{3}\pi+2k\pi;\ x=\dfrac{4}{3}\pi+2k\pi;\ x=2k\pi,\ k\in\mathbf{Z}\right]$

23 A $\cos 2x + 5\,\mathrm{tg}^2 x = 5$ $\left[x = \frac{\pi}{4} + k\frac{\pi}{2},\ k \in \mathbf{Z}\right]$

23 B $\mathrm{cotg}^2 x + 2\cos 2x = 4$ $\left[x = \pm\frac{\pi}{6} + k\pi, k \in \mathbf{Z}\right]$

24 A $2\,\mathrm{sen}\left(\frac{\pi}{6} - 2x\right)\cos\left(2x - \frac{5}{6}\pi\right) + \mathrm{sen}\,\frac{\pi}{3} = 0$ $\left[x = k\frac{\pi}{4},\ k \in \mathbf{Z}\right]$

24 B $4\,\mathrm{sen}\left(\frac{\pi}{3} - x\right)\mathrm{sen}\left(x - \frac{2}{3}\pi\right) + 1 = 0$ $\left[x = \frac{\pi}{4} + k\frac{\pi}{2},\ k \in \mathbf{Z}\right]$

2. LE EQUAZIONI LINEARI IN SENO E COSENO

Risolvi le seguenti equazioni goniometriche lineari.

25 A $\mathrm{sen}\,x + \cos x = 0$ $\left[x = 135° + k180°,\ k \in \mathbf{Z}\right]$

25 B $\mathrm{sen}\,x + \sqrt{3}\cos x = 0$ $\left[x = 120° + k180°,\ k \in \mathbf{Z}\right]$

26 A $\mathrm{sen}\,x + \left(1 - \sqrt{2}\right)\cos x + 1 = 0$ $\left[x = -\frac{\pi}{4} + 2k\pi;\ x = -\frac{\pi}{2} + 2k\pi,\ k \in \mathbf{Z}\right]$

26 B $\mathrm{sen}\,x + \left(1 - \sqrt{2}\right)\cos x - 1 = 0$ $\left[x = \frac{3}{4}\pi + 2k\pi;\ x = \frac{\pi}{2} + 2k\pi,\ k \in \mathbf{Z}\right]$

27 A $\left(2 - \sqrt{3}\right)\mathrm{sen}\,x - \left(3 - 2\sqrt{3}\right)\cos x + \sqrt{3} - 2 = 0$ $\left[x = -\frac{\pi}{6} + 2k\pi;\ x = \frac{\pi}{2} + 2k\pi,\ k \in \mathbf{Z}\right]$

27 B $\left(2 - \sqrt{3}\right)\cos x + \mathrm{sen}\,x + 2 - \sqrt{3} = 0$ $\left[x = -\frac{\pi}{6} + 2k\pi;\ x = \pi + 2k\pi,\ k \in \mathbf{Z}\right]$

28 A $\mathrm{sen}\,x - \left(\sqrt{2} + 1\right)\cos x + 1 = 0$ $\left[x = -\frac{\pi}{2} + 2k\pi;\ x = \frac{\pi}{4} + 2k\pi,\ k \in \mathbf{Z}\right]$

28 B $\left(\sqrt{2} + 1\right)\mathrm{sen}\,x - \cos x - 1 = 0$ $\left[x = -\pi + 2k\pi;\ x = \frac{\pi}{4} + 2k\pi,\ k \in \mathbf{Z}\right]$

3. LE EQUAZIONI OMOGENEE DI SECONDO GRADO IN SENO E COSENO

Risolvi le seguenti equazioni goniometriche.

29 A $2\,\mathrm{sen}^2 x + 3\cos^2 x = 3 + \sqrt{3}\,\mathrm{sen}\,x\cos x$ $\left[x = k\pi;\ x = -\frac{\pi}{3} + k\pi,\ k \in \mathbf{Z}\right]$

29 B $5\operatorname{sen}^2 x+\sqrt{3}\operatorname{sen} x\cos x=5-4\cos^2 x$ $\left[x=\frac{\pi}{2}+k\pi;\ x=\frac{\pi}{6}+k\pi,\ k\in\mathbf{Z}\right]$

30 A $\sqrt{3}\frac{\operatorname{sen}^2 x}{\cos x}+\cos x-\operatorname{sen} x=\sqrt{3}\operatorname{sen} x$ $\left[x=\frac{\pi}{6}+k\pi;\ x=\frac{\pi}{4}+k\pi,\ k\in\mathbf{Z}\right]$

30 B $\frac{\cos^2 x}{\operatorname{sen} x}+\cos x=\sqrt{3}\left(\operatorname{sen} x+\cos x\right)$ $\left[x=\frac{\pi}{6}+k\pi;\ x=-\frac{\pi}{4}+k\pi,\ k\in\mathbf{Z}\right]$

4. I SISTEMI DI EQUAZIONI GONIOMETRICHE

Risolvi i seguenti sistemi.

31 A $\begin{cases}\operatorname{sen} x+\operatorname{sen} y=1\\ \operatorname{sen}^2 x+\operatorname{sen}^2 y=1\end{cases}$ $\left[x=k\pi,\ y=\frac{\pi}{2}+2k_1\pi;\ x=\frac{\pi}{2}+2k\pi,\ y=k_1\pi,\ k,k_1\in\mathbf{Z}\right]$

31 B $\begin{cases}\operatorname{sen} x-\operatorname{sen} y=-1\\ \operatorname{sen}^2 x+\operatorname{sen}^2 y=1\end{cases}$ $\left[x=k\pi,\ y=\frac{\pi}{2}+2k_1\pi;\ x=\frac{3}{2}\pi+2k\pi,\ y=k_1\pi,\ k,k_1\in\mathbf{Z}\right]$

32 A $\begin{cases}\operatorname{sen}^2 x+\cos^2 y=1\\ \cos^2 x-\operatorname{sen}^2 y=1\end{cases}$ $\left[x=k\pi,\ y=k_1\pi,\ k,k_1\in\mathbf{Z}\right]$

32 B $\begin{cases}\operatorname{sen}^2 x+\cos^2 y=1\\ \cos^2 x-\operatorname{sen}^2 y=-1\end{cases}$ $\left[x=\frac{\pi}{2}+k\pi,\ y=\frac{\pi}{2}+k_1\pi,\ k,k_1\in\mathbf{Z}\right]$

5. LE DISEQUAZIONI GONIOMETRICHE

Risolvi in **R** le seguenti disequazioni goniometriche elementari.

33 A $2\operatorname{sen} x+\sqrt{3}<0$ $\left[\frac{4}{3}\pi+2k\pi<x<\frac{5}{3}\pi+2k\pi,\ k\in\mathbf{Z}\right]$

33 B $2\operatorname{sen} x+\sqrt{2}<0$ $\left[\frac{5}{4}\pi+2k\pi<x<\frac{7}{4}\pi+2k\pi,\ k\in\mathbf{Z}\right]$

34 A $2\cos x+\sqrt{2}>0$ $\left[-\frac{3}{4}\pi+2k\pi<x<\frac{3}{4}\pi+2k\pi,\ k\in\mathbf{Z}\right]$

34 B $2\cos x+1>0$ $\left[-\frac{2}{3}\pi+2k\pi<x<\frac{2}{3}\pi+2k\pi,\ k\in\mathbf{Z}\right]$

35 A $\frac{3\operatorname{tg} x+2}{2}>\operatorname{tg} x+1$ $\left[k\pi<x<\frac{\pi}{2}+k\pi,\ k\in\mathbf{Z}\right]$

35 B $\dfrac{2\operatorname{tg} x+3}{3} > \operatorname{tg} x+1$ $\left[-\dfrac{\pi}{2}+k\pi < x < k\pi,\ k\in\mathbf{Z}\right]$

Risolvi le seguenti disequazioni goniometriche non elementari.

36 A $2\operatorname{sen}^2 x-3\operatorname{sen} x+1\le 0$ $\left[\dfrac{\pi}{6}+2k\pi \le x \le \dfrac{5}{6}\pi+2k\pi, k\in\mathbf{Z}\right]$

36 B $2\operatorname{sen}^2 x-\operatorname{sen} x-1\ge 0$ $\left[\dfrac{7}{6}\pi+2k\pi \le x \le \dfrac{11}{6}\pi+2k\pi,\ k\in\mathbf{Z}\right]$

37 A $\operatorname{sen} x-\sqrt{3}\cos x>0$ $\left[\dfrac{\pi}{3}+2k\pi < x < \dfrac{4}{3}\pi+2k\pi, k\in\mathbf{Z}\right]$

37 B $\operatorname{sen} x+\sqrt{3}\cos x<0$ $\left[\dfrac{2}{3}\pi+2k\pi < x < \dfrac{5}{3}\pi+2k\pi,\ k\in\mathbf{Z}\right]$

38 A $\operatorname{sen} x+\sqrt{3}\cos x-1\le 0$ $\left[\dfrac{\pi}{2}+2k\pi \le x \le \dfrac{11}{6}\pi+2k\pi,\ k\in\mathbf{Z}\right]$

38 B $\operatorname{sen} x-\sqrt{3}\cos x+1\ge 0$ $\left[\dfrac{\pi}{6}+2k\pi \le x \le \dfrac{3}{2}\pi+2k\pi,\ k\in\mathbf{Z}\right]$

Risolvi le seguenti disequazioni goniometriche.

39 A $\left(\operatorname{sen} x-\dfrac{1}{2}\right)\left(\operatorname{tg} x-1\right)\le 0$

$\left[\dfrac{\pi}{6}+2k\pi \le x \le \dfrac{\pi}{4}+2k\pi;\ \dfrac{\pi}{2}+2k\pi < x \le \dfrac{5}{6}\pi+2k\pi;\ \dfrac{5}{4}\pi+2k\pi \le x < \dfrac{3}{2}\pi+2k\pi,\ k\in\mathbf{Z}\right]$

39 B $\left(\operatorname{sen} x+\dfrac{1}{2}\right)\left(\operatorname{tg} x-1\right)\ge 0$

$\left[\dfrac{\pi}{4}+2k\pi \le x < \dfrac{\pi}{2}+2k\pi;\ \dfrac{7}{6}\pi+2k\pi \le x \le \dfrac{5}{4}\pi+2k\pi;\ \dfrac{3}{2}\pi+2k\pi < x \le \dfrac{11}{6}\pi+2k\pi,\ k\in\mathbf{Z}\right]$

40 A $\dfrac{\operatorname{sen} x\cdot\cos x}{\operatorname{tg}^2 x-1}>0$

$\left[\dfrac{\pi}{4}+2k\pi < x < \dfrac{\pi}{2}+2k\pi;\ \dfrac{3}{4}\pi+2k\pi < x < \pi+2k\pi;\right.$
$\left.\dfrac{5}{4}\pi+2k\pi < x < \dfrac{3}{2}\pi+2k\pi;\ \dfrac{7}{4}\pi+2k\pi < x < 2\pi+2k\pi,\ k\in\mathbf{Z}\right]$

40 B $\dfrac{\operatorname{sen} x \cdot \cos x}{\operatorname{tg}^2 x - 3} > 0$

$$\left[\frac{\pi}{3} + 2k\pi < x < \frac{\pi}{2} + 2k\pi;\ \frac{2}{3}\pi + 2k\pi < x < \pi + 2k\pi;\ \frac{4}{3}\pi + 2k\pi < x < \frac{3}{2}\pi + 2k\pi;\ \frac{5}{3}\pi + 2k\pi < x < 2\pi + 2k\pi,\ k \in \mathbf{Z}\right]$$

41 A $\dfrac{|2\operatorname{sen} x|}{\operatorname{sen} 2x - \operatorname{sen} x} > 1$ $\left[2k\pi < x < \frac{\pi}{3} + 2k\pi;\ \frac{4}{3}\pi + 2k\pi < x < \frac{5}{3}\pi + 2k\pi,\ k \in \mathbf{Z}\right]$

41 B $\dfrac{|2\cos x|}{\operatorname{sen} 2x - \cos x} > 1$ $\left[\frac{\pi}{6} + 2k\pi < x < \frac{\pi}{2} + 2k\pi;\ \frac{5}{6}\pi + 2k\pi < x < \frac{7}{6}\pi + 2k\pi,\ k \in \mathbf{Z}\right]$

Risolvi i seguenti sistemi di disequazioni.

42 A $\begin{cases} \operatorname{sen} 2x \cdot \cos^2 x > 0 \\ \operatorname{sen} 2x - \cos 2x < 0 \end{cases}$ $\left[k\pi < x < \frac{\pi}{8} + k\pi,\ k \in \mathbf{Z}\right]$

42 B $\begin{cases} \cos 2x \cdot \operatorname{sen}^2 x > 0 \\ \operatorname{sen} 2x - \cos 2x > 0 \end{cases}$ $\left[\frac{\pi}{8} + k\pi < x < \frac{\pi}{4} + k\pi,\ k \in \mathbf{Z}\right]$

43 A
$$\begin{cases} 4\operatorname{sen}^2 x - 1 \geq 0 \\ \operatorname{cotg} x < 1 \\ \operatorname{cotg} x + 2\cos^2 x \leq 0 \end{cases}$$

$$\left[\frac{\pi}{2} + 2k\pi \leq x \leq \frac{2}{3}\pi + 2k\pi;\ \frac{4}{3}\pi + 2k\pi \leq x \leq \frac{3}{2}\pi + 2k\pi,\ k \in \mathbf{Z}\right]$$

43 B
$$\begin{cases} 4\operatorname{sen}^2 x - 1 \geq 0 \\ \operatorname{tg} x < 1 \\ \cos x - 2\cos^2 x \leq 0 \end{cases}$$

$$\left[\frac{\pi}{6} + k\pi \leq x < \frac{\pi}{4} + k\pi;\ \frac{3}{2}\pi + 2k\pi; < x \leq \frac{5}{6}\pi + 2k\pi;\ \frac{5}{3}\pi + 2k\pi \leq x \leq \frac{11}{6}\pi + 2k\pi,\ k \in \mathbf{Z}\right]$$