

$$1) \cos(4-2x) = -\frac{1}{2} \Rightarrow 4-2x = \pm \arccos(-\frac{1}{2}) + 2\pi k \Rightarrow$$

$$\Rightarrow -2x = \pi \pm \frac{\pi}{3} + 2\pi k - 4 \Rightarrow 2x = 4 - \pi \pm \frac{\pi}{3} + 2\pi k \Rightarrow$$

$$\Rightarrow x = 2 - \frac{\pi}{2} \pm \frac{\pi}{6} + \pi k \quad k \in \mathbb{Z}$$

$$2) 2 \sin(3x - \frac{\pi}{4}) + 1 = 0 \Rightarrow \sin(3x - \frac{\pi}{4}) = -\frac{1}{2} \Rightarrow$$

$$3x - \frac{\pi}{4} = (-1)^k \arcsin(-\frac{1}{2}) + 2\pi k \Rightarrow -1(-1)^k \arcsin(\frac{1}{2}) + 2\pi k \Rightarrow$$

$$3x - \frac{\pi}{4} = (-1)^{k+1} \frac{\pi}{6} + 2\pi k; \quad 3x = \frac{\pi}{4} + (-1)^{k+1} \frac{\pi}{6} + 2\pi k;$$

$$x = \frac{\pi}{12} + (-1)^{k+1} \frac{\pi}{18} + \frac{2\pi}{3} k \quad k \in \mathbb{Z}$$

$$3) 2 \cos^2 x + 5 \cos x = 3$$

$$2 \cos^2 x + 5 \cos x - 3 = 0$$

$$\begin{cases} \cos x = \frac{-5 + \sqrt{25+24}}{4} \\ \cos x = \frac{-5 - \sqrt{25+24}}{4} \end{cases} \Rightarrow \begin{cases} \cos x = \frac{-5 + \sqrt{49}}{4} \\ \cos x = \frac{-5 - \sqrt{49}}{4} \end{cases} \Rightarrow \begin{cases} \cos x = \frac{1}{2} \\ \cos x = -3 \end{cases}$$

$\cos x = -3$  не имеет решений

$$\cos x = \frac{1}{2} \quad x = \pm \frac{\pi}{3} + 2\pi k$$

$$4) \operatorname{tg} x - 3 \operatorname{ctg} x = 0 \Rightarrow \frac{\sin x}{\cos x} - \frac{3 \cos x}{\sin x} = 0 \Rightarrow$$

$$= \frac{\sin^2 x - 3 \cos^2 x}{\sin x \cos x} = 0 \Rightarrow \sin^2 x - 3 \cos^2 x = 0 \Rightarrow$$

$$2 \cos^2 x + \cos^2 x - \sin^2 x = 0 \Rightarrow \cos 2x + 1 + \cos 2x = 0 \Rightarrow$$

$$2 \cos 2x = -1 \Rightarrow \cos 2x = -\frac{1}{2} \Rightarrow 2x = \pi \pm \frac{\pi}{3} + 2\pi k \Rightarrow$$

$$x = \frac{\pi}{2} \pm \frac{\pi}{6} + \pi k \quad k \in \mathbb{Z}$$

$$5) \sin 3x - \sin x = 0 \Rightarrow \sin x (3 \cos^2 x - \sin^2 x) - \sin x = 0 \Rightarrow$$

$$\Rightarrow \sin x (2 \cos^2 x + \cos^2 x - \sin^2 x) - \sin x = 0 \Rightarrow$$

$$\Rightarrow \sin x (\cos 2x + 1 + \cos 2x) - \sin x = 0 \Rightarrow \sin x (2 \cos 2x + 1) - \sin x = 0$$

$$\Rightarrow \sin x (2 \cos 2x + 1 - 1) = 0 \Rightarrow \sin x (2 \cos 2x) = 0$$

$$\begin{cases} \sin x = 0 \\ \cos 2x = 0 \end{cases} \Rightarrow \begin{cases} x = \pi k \\ 2x = \frac{\pi}{2} + \pi n \end{cases} \Rightarrow \begin{cases} x = \pi k & k \in \mathbb{Z} \\ x = \frac{\pi}{4} + \frac{\pi}{2} n & n \in \mathbb{Z} \end{cases}$$

$$\begin{aligned} 6) 2 \sin x + \sin 2x = 0 &\Rightarrow 2 \sin x + 2 \sin x \cos x = 0 \Rightarrow \\ &\Rightarrow 2 \sin x (1 + \cos x) = 0 \Rightarrow \begin{cases} \sin x = 0 \\ \cos x = -1 \end{cases} \Rightarrow \begin{cases} x = \pi k \quad k \in \mathbb{Z} \\ x = \pi + 2\pi n \quad n \in \mathbb{Z} \end{cases} \end{aligned}$$

Если что не так, сообщите, я исправлю  
с уважением . . . .