Rješenja zadataka 5.1

Zadatak 1.

1) $\sin\left(\frac{x}{2}+\frac{\pi}{6}\right)=-1;$

2) $\sqrt{2}\cos\left(2x-\frac{\pi}{5}\right)-1=0;$

3) $2\sin\left(x-\frac{\pi}{3}\right)=\sqrt{3};$

4) $3\,\mathrm{tg}\left(x-\frac{\pi}{6}\right)=-\sqrt{3};$

5) $\sqrt{3}\,\mathrm{ctg}\left(\frac{\pi}{4}-\frac{x}{3}\right)-1=0.$

Rješenje. **1)**

$$\begin{aligned}
&\sin\left(\frac{x}{2}+\frac{\pi}{6}\right)=-1\\
&\frac{x}{2}+\frac{\pi}{6}=\frac{3\pi}{2}+2k\pi\\
&\frac{x}{2}=\frac{3\pi}{2}-\frac{\pi}{6}+2k\pi\\
&\frac{x}{2}=\frac{4\pi}{3}+2k\pi \quad /\cdot 2\\
&x=\frac{8\pi}{3}+k\cdot 4\pi,\quad k\in\mathbf{Z};
\end{aligned}$$

2)

$$\begin{aligned}
&\sqrt{2}\cos\left(2x-\frac{\pi}{5}\right)-1=0\\
&\sqrt{2}\cos\left(2x-\frac{\pi}{5}\right)=1 \quad /:\sqrt{2}\\
&\cos\left(2x-\frac{\pi}{5}\right)=\frac{\sqrt{2}}{2} \quad /:\sqrt{2}\\
&2x-\frac{\pi}{5}=\pm\frac{\pi}{4}+2k\pi\\
&2x=\frac{4\pi\pm 5\pi}{20}+2k\pi \quad /:2\\
&x=\frac{4\pi\pm 5\pi}{40}+2k\pi\\
&x=\frac{\pi}{10}\pm\frac{\pi}{8}+k\cdot\pi,\quad k\in\mathbf{Z};
\end{aligned}$$

3)

$$2\sin\left(x-\frac{\pi}{3}\right)=\sqrt{3}$$
$$\sin\left(x-\frac{\pi}{3}\right)=\frac{\sqrt{3}}{2}$$
$$x_1-\frac{\pi}{3}=\frac{\pi}{3}+2k\pi,\quad x_2-\frac{\pi}{3}=\frac{2\pi}{3}+2k\pi$$
$$x_1=\frac{2\pi}{3}+k\cdot 2\pi,\qquad x_2=(2k+1)\pi,\ \ k\in\mathbf{Z};$$

4)

$$3\,\mathrm{tg}\left(x-\frac{\pi}{6}\right)=-\sqrt{3}$$
$$\mathrm{tg}\left(x-\frac{\pi}{6}\right)=-\frac{\sqrt{3}}{3}$$
$$x-\frac{\pi}{6}=\frac{5\pi}{6}+k\pi$$
$$x=\pi+l\pi,\ \ l\in\mathbf{Z}$$
$$x=k\pi,\ \ k\in\mathbf{Z};$$

5)

$$\sqrt{3}\,\mathrm{ctg}\left(\frac{\pi}{4}-\frac{x}{3}\right)-1=0$$
$$\sqrt{3}\,\mathrm{ctg}\left(\frac{\pi}{4}-\frac{x}{3}\right)=1$$
$$\mathrm{ctg}\left(\frac{\pi}{4}-\frac{x}{3}\right)=\frac{\sqrt{3}}{3}$$
$$\frac{\pi}{4}-\frac{x}{3}=\frac{\pi}{3}+k\pi$$
$$-\frac{x}{3}=\frac{\pi}{12}+k\pi$$
$$x=-\frac{\pi}{4}+k\cdot 3\pi,\ \ k\in\mathbf{Z}.$$