Zadatak 15. Riješi jednadžbe:

1) $\sin x \cdot \sin 2x + \cos 3x = 0$;
2) $\sin x + \sin 2x \cdot \cos 3x = 0$;
3) $\sin 5x = \sin 2x \cdot \cos 3x$;
4) $\sin \frac{3x}{2} = \sin \frac{x}{2} \cdot \cos x$.

Rješenje. **1)**

$$\sin x \cdot \sin 2x + \cos 3x = 0$$
$$\sin x \cdot \sin 2x + \cos(x + 2x) = 0$$
$$\sin x \cdot \sin 2x + \cos x \cos 2x - \sin x \sin 2x = 0$$
$$\cos x \cos 2x = 0$$
$$1^\circ \quad \cos x = 0 \implies x_1 = \frac{2k+1}{2}\pi,$$
$$2^\circ \quad \cos 2x = 0 \implies 2x_2 = \frac{2k+1}{2}\pi, \quad x_2 = \frac{2k+1}{4}\pi; \qquad k \in \mathbf{Z}$$

2)

$$\sin x + \sin 2x \cdot \cos 3x = 0$$
$$\sin(3x - 2x) + \sin 2x \cdot \cos 3x = 0$$
$$\sin 3x \cos 2x - \cos 3x \sin 2x + \sin 2x \cdot \cos 3x = 0$$
$$\sin 3x \cos 2x = 0$$
$$1^\circ \quad \sin 3x = 0 \implies 3x_1 = k\pi, \quad x_1 = \frac{k\pi}{3},$$
$$2^\circ \quad \cos 2x = 0 \implies 2x_2 = \frac{2k+1}{2}\pi, \quad x_2 = \frac{2k+1}{4}\pi; \qquad k \in \mathbf{Z}$$

3)

$$\sin 5x = \sin 2x \cdot \cos 3x$$
$$\sin(3x + 2x) - \sin 2x \cdot \cos 3x = 0$$
$$\sin 3x \cos 2x + \cos 3x \sin 2x - \sin 2x \cdot \cos 3x = 0$$
$$\sin 3x \cos 2x = 0$$
$$1^\circ \quad \sin 3x = 0 \implies 3x_1 = k\pi, \quad x_1 = \frac{k\pi}{3},$$
$$2^\circ \quad \cos 2x = 0 \implies 2x_2 = \frac{2k+1}{2}\pi, \quad x_2 = \frac{2k+1}{4}\pi; \qquad k \in \mathbf{Z}$$

4)

$$\sin\frac{3x}{2} = \sin\frac{x}{2}\cdot\cos x$$
$$\sin\left(x+\frac{x}{2}\right) - \sin\frac{x}{2}\cdot\cos x = 0$$
$$\sin x\cos\frac{x}{2} + \cos x\sin\frac{x}{2} - \sin\frac{x}{2}\cdot\cos x = 0$$
$$\sin x\cos\frac{x}{2} = 0$$
$$1^\circ \quad \sin x = 0 \implies x_1 = k\pi,$$
$$2^\circ \quad \cos\frac{x}{2} = 0 \implies \frac{x_2}{2} = \frac{2k+1}{2}\pi, \quad x_2 = (2k+1)\pi;$$

x_2 je sadržan u x_1 pa je rješenje

$$x = k\pi, \quad k \in \mathbf{Z}.$$