Zadatak 9. Odredi temeljni period svake od sljedećih funkcija:

1) $f(x) = 2\sin(3x-1)$;

2) $f(x) = -\frac{1}{2}\cos\frac{x-\pi}{4}$;

3) $f(x) = -\operatorname{tg}(2x+\frac{\pi}{2})$;

4) $f(x) = \operatorname{ctg}(1-\frac{x}{2})$;

5) $f(x) = -\sin\pi(x+11)$;

6) $f(x) = 3\cos(2-\frac{\pi}{3}x)$;

7) $f(x) = |\sin 2(x-\pi)|$;

8) $f(x) = 2|\cos 3\pi x| - 1$.

Rješenje.

1) $f(x) = 2\sin(3x-1)$, $\omega = 3$, $P = \frac{2\pi}{\omega} = \frac{2\pi}{3}$;

2) $f(x) = -\frac{1}{2}\cos\frac{x-\pi}{4} = -\frac{1}{2}\cos\left(\frac{x}{4}-\frac{\pi}{4}\right)$, $\omega = \frac{1}{4}$, $P = \frac{2\pi}{\omega} = \frac{2\pi}{\frac{1}{4}} = 8\pi$;

3) $f(x) = -\operatorname{tg}\left(2x+\frac{\pi}{2}\right)$, $\omega = 2$, $P = \frac{\pi}{\omega} = \frac{\pi}{2}$;

4) $f(x) = \operatorname{ctg}(1-\frac{x}{2})$, $\omega = \frac{1}{2}$, $P = \frac{\pi}{\omega} = \frac{\pi}{\frac{1}{2}} = 2\pi$;

5) $f(x) = -\sin\pi(x+11) = -\sin(x\pi+11\pi)$, $\omega = \pi$, $P = \frac{2\pi}{\omega} = \frac{2\pi}{\pi} = 2$;

6) $f(x) = 3\cos\left(2-\frac{\pi}{3}x\right)$, $\omega = \frac{\pi}{3}$, $P = \frac{2\pi}{\omega} = \frac{2\pi}{\frac{\pi}{3}} = 6$;

7) $f(x) = |\sin 2(x-\pi)| = |\sin(2x-2\pi)|$.

Za $f(x) = \sin(2x-2\pi)$ imamo: $\omega' = 2$, $P' = \frac{2\pi}{\omega'} = \pi$.

Za $f(x) = |\sin(2x-2\pi)|$ je onda $P = \frac{P'}{2} = \frac{\pi}{2}$;

8) $f(x) = 2|\cos 3\pi x| - 1$

Za $f(x) = 2\cos 3\pi x - 1$ imamo: $\omega' = 3\pi$, $P' = \frac{2\pi}{\omega'} = \frac{2\pi}{3\pi} = \frac{2}{3}$.

Za $f(x) = 2|\cos 3\pi x| - 1$ je onda $P = \frac{P'}{2} = \frac{\frac{2}{3}}{2} = \frac{1}{3}$.