

1.

а) $2 \cos^2 x + 5 \sin x - 4 = 0$; б) $6 \cos^2 x + 5 \sin x - 7 = 0$; в) $\sin x - 2 \cos 2x = 1$; г) $3 \sin^2 2x + 7 \cos 2x - 3 = 0$.

2.

а) $\cos x + \sin x = 0$; б) $2 \cos x = \sin x$; в) $\sin^2 x - 2 \sin x \cos x = 3 \cos^2 x$;
г) $6 \sin^2 x + \sin x \cos x - \cos^2 x = 2$; д) $\cos^2 x - 3 \sin x \cos x = \sin \frac{3\pi}{2}$.

3.

а) $\sin x = \sin 5x$; б) $\cos 2x = \sin 5x$; в) $1 + \cos x + \cos 2x + \cos 3x = 0$;
г) $\cos 5x + \cos 7x = \cos(\pi + 6x)$; д) $\sin 3x + \sin 5x = \sin 4x$. е) $1 - \cos(\pi + x) - \sin\left(\frac{3\pi+x}{2}\right) = 0$.

4.

а) $\sin 2x \sin 6x = \cos x \cos 3x$; б) $\sin x \sin 3x + \sin 4x \sin 8x = 0$;
в) $\sin x \cos 2x + \cos x \cos 4x = \sin\left(\frac{\pi}{4} + 2x\right) \sin\left(\frac{\pi}{4} - 3x\right)$ г) $\cos 3x \cos 6x = \cos 4x \cos 7x$.

5.

а) $\sin x - \cos x = 1$; б) $4 \sin x + 3 \cos x = 5$; в) $\sin x - 4 \cos x = 4$; г) $2 \sin x - \cos x = \frac{2}{5}$.

6.

а) $\sin^2 2x + \sin^2 3x + \sin^2 4x + \sin^2 5x = 2$; б) $\cos^2 x + \cos^2 2x - \cos^2 3x - \cos^2 4x = 0$;
в) $\cos^2 \frac{x}{2} + \cos^2 \frac{3x}{2} - \sin^2 2x - \sin^2 4x = 0$; г) $\sin^2 3x + \sin^2 4x = \sin^2 5x + \sin^2 6x$.

7.

а) $\sin 2x = \cos^4 \frac{x}{2} - \sin^4 \frac{x}{2}$; б) $\sin^4 x + \cos^4 x = \frac{5}{8}$; в) $\sin^4 2x + \cos^4 2x = \sin 2x \cos 2x$;
г) $\sin^4 x + \cos^4 x - 2 \sin 2x + \frac{3}{2} \sin^2 2x = 0$ д) $\sin^4 x + \cos^4 x = \cos 4x$.

8.

а) $\operatorname{tg} x + \operatorname{ctg} x = 2$; б) $1 + (1 + \sqrt{2})(\sin x + \cos x) + \sqrt{2} = \sin 2x$;
в) $\sin^3 x - \cos^3 x = 1 + \sin x \cos x$; г) $\sin 2x + 5(\sin x + \cos x) + 1 = 0$;
д) $(1 - \sin 2x)(\cos x - \sin x) = 1 - 2 \sin^2 x$; е) $\operatorname{ctg} x - \operatorname{tg} x = \frac{\cos x - \sin x}{0,5 \cdot \sin 2x}$.

9.

а) $\sin(15^\circ + x) + \sin(45^\circ - x) = 1$; б) $\cos(20^\circ + x) + \cos(100^\circ - x) = \frac{1}{2}$; в) $\operatorname{tg}(70^\circ + x) + \operatorname{tg}(20^\circ - x) = 2$;
г) $\operatorname{tg}(35^\circ + x) \operatorname{ctg}(10^\circ - x) = \frac{2}{3}$; д) $\operatorname{tg} x + \operatorname{tg} 50^\circ + \operatorname{tg} 70^\circ = \operatorname{tg} x \cdot \operatorname{tg} 50^\circ \cdot \operatorname{tg} 70^\circ$.

10. а) $\sin^{2010} x + \cos^{2010} x = 1$; б) $\sin^2 x + \sin^2 3x = 0$; в) $\sin x + \cos 7x = 2$; г) $\cos 4x \cdot \cos 5x = 1$.

11.

а) $\sin 2x + 2 \operatorname{ctg} x = 3$; б) $\cos 3x - \sin x = \sqrt{3}(\cos x - \sin 3x)$; в) $1 + 2 \cos 3x \cos x - \cos 2x = 0$;
г) $4 \cos^3 x + 3\sqrt{2} \sin 2x = 8 \cos x$; д) $8 \sin^4 x + 13 \cos 2x = 7$;
е) $2 \cos 2x + \cos^2 \frac{x}{2} - 10 \cos\left(\frac{5\pi}{2} - x\right) + \frac{7}{2} = \frac{1}{2} \cos x$.
ж) $\sqrt{2} \cos\left(\frac{x}{5} - \frac{\pi}{12}\right) - \sqrt{6} \sin\left(\frac{x}{5} - \frac{\pi}{12}\right) = 2 \sin\left(\frac{x}{5} + \frac{2\pi}{3}\right) - 2 \sin\left(\frac{3x}{5} + \frac{\pi}{6}\right)$;
з) $\cos\left(x - \frac{\pi}{6}\right) + \sin\left(x - \frac{\pi}{3}\right) + \cos 2x = 1$; и) $\operatorname{ctg}^4 x = \cos^3 2x + 1$; к) $\sin x + \sin^2 x + \cos^3 x = 0$;
л) $\operatorname{tg} 2x + \sin 2x = \frac{8}{3} \operatorname{ctg} x$; м) $\cos^4 x = \frac{1}{4} \cos 2x + \frac{1}{2} \cos^2 x \cos 8x$;
н) $2 \sin x + 8 \cos x \cdot \cos 2x = \sin 2x(\cos x - \sin x)$; о) $1 + \frac{1}{(1 + \operatorname{tg} x)^2} = \frac{40}{9} \operatorname{ctg} x$.