

ЕГЭ ПУ Прототип задания № ПУ-13.1 (Тригонометрические уравнения)

№	а) Решите уравнение; б) Укажите корни уравнения, принадлежащие отрезку.	Отрезок		Ответ
1	$4 \sin^3 x = \cos \left(x - \frac{5\pi}{2} \right)$	$\left[\frac{3\pi}{2}; \frac{5\pi}{2} \right]$		$\pi k; \pm \frac{\pi}{6} + \pi k, k \in \mathbb{Z}$ $\frac{11\pi}{6}; 2\pi; \frac{13\pi}{6}$
2	$2 \cos^3 x = \sin \left(\frac{5\pi}{2} - x \right)$	$[-2\pi; -\pi]$		$\frac{\pi}{2} + \pi k; \pm \frac{\pi}{4} + \pi k, k \in \mathbb{Z}$ $-\frac{7\pi}{4}; -\frac{3\pi}{2}; -\frac{5\pi}{4}$
3	$4 \cos^3 x + \sin \left(x - \frac{\pi}{2} \right) = 0$	$[\pi; 2\pi]$		$\frac{\pi}{2} + \pi k; \pm \frac{\pi}{3} + \pi k, k \in \mathbb{Z}$ $\frac{4\pi}{3}; \frac{3\pi}{2}; \frac{5\pi}{3}$
4	$4 \cos^3 x + 3 \sin \left(x - \frac{\pi}{2} \right)$	$[-2\pi; -\pi]$		$\frac{\pi}{2} + \pi k; \pm \frac{\pi}{6} + \pi k, k \in \mathbb{Z}$ $-\frac{11\pi}{6}; -\frac{3\pi}{2}; -\frac{7\pi}{6}$
5	$4 \sin^3 x = 3 \cos \left(x - \frac{\pi}{2} \right)$	$\left[\frac{7\pi}{2}; \frac{9\pi}{2} \right]$		$\pi k; \pm \frac{\pi}{3} + \pi k, k \in \mathbb{Z}$ $\frac{11\pi}{3}; 4\pi; \frac{13\pi}{3}$
6	$2 \sin^3 x = \cos \left(x - \frac{\pi}{2} \right)$	$\left[-\frac{3\pi}{2}; -\frac{\pi}{2} \right]$		$\pi k; \pm \frac{\pi}{4} + \pi k, k \in \mathbb{Z}$ $-\frac{5\pi}{4}; -\pi; -\frac{3\pi}{4}$
7	$4 \sin^3 x = 3 \cos \left(x + \frac{3\pi}{2} \right)$	$[-2\pi; -\frac{\pi}{2}]$		$\frac{\pi k}{3}, k \in \mathbb{Z}$ $-2\pi; -\frac{5\pi}{3}; -\frac{4\pi}{3}; -\pi; -\frac{2\pi}{3}$
8	$2 \cos^2 x = \sqrt{3} \sin \left(\frac{3\pi}{2} + x \right)$	$\left[\pi; \frac{5\pi}{2} \right]$		$\frac{\pi}{2} + \pi k; \pm \frac{5\pi}{6} + 2\pi k, k \in \mathbb{Z}$ $\frac{7\pi}{6}; \frac{3\pi}{2}; \frac{5\pi}{2}$
9	$2 \cos^2 x = \sin \left(\frac{\pi}{2} - x \right)$	$\left[\frac{5\pi}{2}; 4\pi \right]$		$\frac{\pi}{2} + \pi k; \pm \frac{\pi}{3} + 2\pi k, k \in \mathbb{Z}$ $\frac{5\pi}{2}; \frac{7\pi}{2}; \frac{11\pi}{2}$
10	$\sqrt{2} \sin^2 x = \cos \left(\frac{\pi}{2} - x \right)$	$[-3\pi; -\frac{3\pi}{2}]$		$\pi k; \frac{\pi}{4} + 2\pi k; \frac{3\pi}{4} + 2\pi k$ $-3\pi; -2\pi; -\frac{7\pi}{4}$
11	$2 \sin^2 x = \cos \left(\frac{3\pi}{2} - x \right)$	$\left[-\frac{5\pi}{2}; -\pi \right]$		$\pi k; -\frac{\pi}{6} + 2\pi k; -\frac{5\pi}{6} + 2\pi k$ $-\frac{13\pi}{6}; -2\pi; -\pi$
12	$\sqrt{2} \cos^2 x = \sin \left(\frac{\pi}{2} + x \right)$	$\left[-\frac{7\pi}{2}; -2\pi \right]$		$\frac{\pi}{2} + \pi k; \pm \frac{\pi}{4} + 2\pi k, k \in \mathbb{Z}$ $-\frac{7\pi}{2}; -\frac{5\pi}{2}; -\frac{9\pi}{2}$
13	$2 \sin^2 x = \sqrt{3} \cos \left(\frac{\pi}{2} + x \right)$	$\left[\frac{3\pi}{2}; 3\pi \right]$		$\pi k; \frac{4\pi}{3} + 2\pi k; \frac{5\pi}{3} + 2\pi k$ $\frac{5\pi}{3}; 2\pi; 3\pi$
14	$2 \sin^2 \left(\frac{3\pi}{2} + x \right) = \sqrt{3} \cos x$	$\left[-\frac{7\pi}{2}; -2\pi \right]$		$\frac{\pi}{2} + \pi k; \pm \frac{\pi}{6} + 2\pi k, k \in \mathbb{Z}$ $-\frac{7\pi}{2}; -\frac{5\pi}{2}; -\frac{13\pi}{2}$
15	$2 \sin^2 \left(\frac{3\pi}{2} - x \right) = \cos x$	$\left[-\frac{3\pi}{2}; 0 \right]$		$\frac{\pi}{2} + \pi k; \pm \frac{\pi}{3} + 2\pi k, k \in \mathbb{Z}$ $-\frac{3\pi}{2}; -\frac{\pi}{2}; \frac{\pi}{2}$
16	$\cos 2x + \sin^2 x = 0,75$	$\left[\pi; \frac{5\pi}{2} \right]$		$\pm \frac{\pi}{6} + \pi k, k \in \mathbb{Z}$ $\frac{7\pi}{6}; \frac{11\pi}{6}; \frac{13\pi}{6}$
17	$\cos 2x + 0,75 = \cos^2 x$	$\left[-4\pi; -\frac{5\pi}{2} \right]$		$\pm \frac{\pi}{3} + \pi k, k \in \mathbb{Z}$ $-\frac{11\pi}{3}; -\frac{10\pi}{3}; -\frac{8\pi}{3}$
18	$\cos 2x + 0,25 = \cos^2 x$	$\left[2\pi; \frac{7\pi}{2} \right]$		$\pm \frac{\pi}{6} + \pi k, k \in \mathbb{Z}$ $\frac{13\pi}{6}; \frac{17\pi}{6}; \frac{19\pi}{6}$
19	$\cos 2x + \sin^2 x = 0,5$	$\left[-\frac{7\pi}{2}; -2\pi \right]$		$\frac{\pi}{4} + \frac{\pi k}{2}, k \in \mathbb{Z}$ $-\frac{13\pi}{4}; -\frac{11\pi}{4}; -\frac{9\pi}{4}$
20	$\cos 2x + 0,5 = \cos^2 x$	$\left[-2\pi; -\frac{\pi}{2} \right]$		$\pm \frac{\pi}{4} + \pi k, k \in \mathbb{Z}$ $-\frac{7\pi}{4}; -\frac{5\pi}{4}; -\frac{3\pi}{4}$
21	$\cos 2x + \sin^2 x = 0,25$	$\left[3\pi; \frac{9\pi}{2} \right]$		$\pm \frac{\pi}{3} + \pi k, k \in \mathbb{Z}$ $\frac{10\pi}{3}; \frac{11\pi}{3}; \frac{13\pi}{3}$
22	$\cos 2x - \sin^2 \left(\frac{\pi}{2} - x \right) = -0,25$	$\left[\pi; \frac{5\pi}{2} \right]$		$\pm \frac{\pi}{6} + \pi k, k \in \mathbb{Z}$ $\frac{7\pi}{6}; \frac{11\pi}{6}; \frac{13\pi}{6}$

23	$\sin 2x = \cos \left(\frac{3\pi}{2} + x \right)$	$\left[\frac{3\pi}{2}; \frac{5\pi}{2} \right]$		$\pi\kappa; \pm \frac{\pi}{3} + 2\pi\kappa, \kappa \in \mathbb{Z}$	$\frac{5\pi}{3}; 2\pi; \frac{7\pi}{3}$
24	$\sin 2x + \sqrt{3} \sin x = 0$	$\left[\frac{5\pi}{2}; \frac{7\pi}{2} \right]$		$\pi\kappa; \pm \frac{5\pi}{6} + 2\pi\kappa, \kappa \in \mathbb{Z}$	$\frac{17\pi}{6}; 3\pi; \frac{19\pi}{6}$
25	$\sin 2x = \cos \left(\frac{5\pi}{2} - x \right)$	$\left[-\frac{9\pi}{2}; -\frac{7\pi}{2} \right]$		$\pi\kappa; \pm \frac{\pi}{3} + 2\pi\kappa, \kappa \in \mathbb{Z}$	$-\frac{13\pi}{3}; -4\pi; -\frac{11\pi}{3}$
26	$\sin 2x = \cos \left(x - \frac{3\pi}{2} \right)$	$\left[\frac{5\pi}{2}; \frac{7\pi}{2} \right]$		$\pi\kappa; \pm \frac{2\pi}{3} + 2\pi\kappa, \kappa \in \mathbb{Z}$	$\frac{8\pi}{3}; 3\pi; \frac{10\pi}{3}$
27	$\sin 2x = \sqrt{2} \cos \left(\frac{\pi}{2} + x \right)$	$[-2\pi; -\pi]$		$\pi\kappa; \pm \frac{3\pi}{4} + 2\pi\kappa, \kappa \in \mathbb{Z}$	$-2\pi; -\frac{5\pi}{4}; -\pi$
28	$\sin 2x = \sqrt{3} \cos \left(\frac{3\pi}{2} - x \right)$	$[-3\pi; -2\pi]$		$\pi\kappa; \pm \frac{5\pi}{6} + 2\pi\kappa, \kappa \in \mathbb{Z}$	$-3\pi; -\frac{17\pi}{6}; -2\pi$
29	$\sin 2x = \sqrt{3} \sin \left(\frac{3\pi}{2} - x \right)$	$[3\pi; 4\pi]$		$\frac{\pi}{2} + \pi\kappa; \frac{4\pi}{3} + 2\pi\kappa; \frac{5\pi}{3} + 2\pi\kappa$	$\frac{10\pi}{3}; \frac{7\pi}{2}; \frac{11\pi}{3}$
30	$\sin 2x = \sin \left(x + \frac{3\pi}{2} \right)$	$\left[-\frac{7\pi}{2}; -\frac{5\pi}{2} \right]$		$\frac{\pi}{2} + \pi\kappa; -\frac{\pi}{6} + 2\pi\kappa; -\frac{5\pi}{6} + 2\pi\kappa$	$-\frac{7\pi}{2}; -\frac{17\pi}{6}; -\frac{5\pi}{2}$
31	$\sin 2x = \sin \left(\frac{5\pi}{2} + x \right)$	$\left[\frac{7\pi}{2}; \frac{9\pi}{2} \right]$		$\frac{\pi}{2} + \pi\kappa; \frac{\pi}{6} + 2\pi\kappa; \frac{5\pi}{6} + 2\pi\kappa$	$\frac{7\pi}{2}; \frac{25\pi}{6}; \frac{9\pi}{2}$
32	$\sin 2x = \sin \left(\frac{\pi}{2} + x \right)$	$\left[-\frac{7\pi}{2}; -\frac{5\pi}{2} \right]$		$\frac{\pi}{2} + \pi\kappa; \frac{\pi}{6} + 2\pi\kappa; \frac{5\pi}{6} + 2\pi\kappa$	$-\frac{7\pi}{2}; -\frac{19\pi}{6}; -\frac{5\pi}{2}$
33	$\sin 2x = \sqrt{2} \sin \left(\frac{\pi}{2} - x \right)$	$\left[\frac{5\pi}{2}; \frac{7\pi}{2} \right]$		$\frac{\pi}{2} + \pi\kappa; \frac{\pi}{4} + 2\pi\kappa; \frac{3\pi}{4} + 2\pi\kappa$	$\frac{5\pi}{2}; \frac{11\pi}{4}; \frac{7\pi}{2}$
34	$2 \sin \left(\frac{7\pi}{2} + x \right) \cdot \sin x = \sqrt{3} \cos x$	$[-7\pi; -6\pi]$		$\frac{\pi}{2} + \pi\kappa; -\frac{\pi}{3} + 2\pi\kappa; -\frac{2\pi}{3} + 2\pi\kappa$	$-\frac{20\pi}{3}; -\frac{13\pi}{2}; -\frac{19\pi}{3}$
35	$-\sqrt{2} \sin \left(-\frac{5\pi}{2} + x \right) \cdot \sin x = \cos x$	$\left[\frac{9\pi}{2}; 6\pi \right]$		$\frac{\pi}{2} + \pi\kappa; \frac{\pi}{4} + 2\pi\kappa; \frac{3\pi}{4} + 2\pi\kappa$	$\frac{9\pi}{2}; \frac{19\pi}{4}; \frac{11\pi}{2}$
36	$\sqrt{2} \sin \left(-\frac{\pi}{2} + x \right) \cdot \sin x = \cos x$	$[-4\pi; -\frac{5\pi}{2}]$		$\frac{\pi}{2} + \pi\kappa; -\frac{\pi}{4} + 2\pi\kappa; -\frac{3\pi}{4} + 2\pi\kappa$	$-\frac{7\pi}{2}; -\frac{11\pi}{4}; -\frac{5\pi}{2}$
37	$\sqrt{2} \sin \left(\frac{3\pi}{2} - x \right) \cdot \sin x = \cos x$	$[-5\pi; -4\pi]$		$\frac{\pi}{2} + \pi\kappa; -\frac{\pi}{4} + 2\pi\kappa; -\frac{3\pi}{4} + 2\pi\kappa$	$-\frac{19\pi}{4}; -\frac{9\pi}{2}; -\frac{17\pi}{4}$
38	$-\sqrt{2} \sin \left(-\frac{3\pi}{2} + x \right) \cdot \sin x = \cos x$	$\left[\frac{9\pi}{2}; 6\pi \right]$		$\frac{\pi}{2} + \pi\kappa; \frac{\pi}{4} + 2\pi\kappa; \frac{3\pi}{4} + 2\pi\kappa$	$\frac{9\pi}{2}; \frac{19\pi}{4}; \frac{11\pi}{2}$
39	$\cos \left(\frac{\pi}{2} - 2x \right) + \sin x = 0$	$\left[-\frac{3\pi}{2}; -\frac{\pi}{2} \right]$		$\pi\kappa; \pm \frac{2\pi}{3} + 2\pi\kappa, \kappa \in \mathbb{Z}$	$-\frac{4\pi}{3}; -\pi; -\frac{2\pi}{3}$
40	$\cos \left(\frac{\pi}{2} + 2x \right) + \sin x = 0$	$\left[\frac{3\pi}{2}; \frac{5\pi}{2} \right]$		$\pi\kappa; \pm \frac{\pi}{3} + 2\pi\kappa, \kappa \in \mathbb{Z}$	$\frac{5\pi}{3}; 2\pi; \frac{7\pi}{3}$
41	$\cos \left(\frac{3\pi}{2} + 2x \right) = \cos x$	$[-\pi; 2\pi]$		$\frac{\pi}{2} + \pi\kappa; \frac{\pi}{6} + 2\pi\kappa; \frac{5\pi}{6} + 2\pi\kappa$	$-\frac{\pi}{2}; \frac{\pi}{6}; \frac{\pi}{2}; \frac{5\pi}{6}; \frac{3\pi}{2}$
42	$\operatorname{tg} x + \cos \left(\frac{3\pi}{2} - 2x \right) = 0$	$\left[-\frac{3\pi}{2}; -\frac{\pi}{2} \right]$		$\pi\kappa; \frac{\pi}{4} + \frac{\pi\kappa}{2}, \kappa \in \mathbb{Z}$	$-\frac{5\pi}{4}; -\pi; -\frac{3\pi}{4}$
43*	$6 \cos^2 x - 7 \cos x - 5 = 0$	$[-\pi; 2\pi]$		$\pm \frac{2\pi}{3} + 2\pi\kappa, \kappa \in \mathbb{Z}$	$-\frac{2\pi}{3}; \frac{2\pi}{3}; \frac{4\pi}{3}$
44	$6 \sin^2 x + 7 \cos x - 1 = 0$	$\left[-\frac{7\pi}{2}; -\frac{5\pi}{2} \right]$		$\pm \frac{2\pi}{3} + 2\pi\kappa, \kappa \in \mathbb{Z}$	$-\frac{10\pi}{3}; -\frac{8\pi}{3}$
45	$6 \sin^2 x + 5 \cos x - 2 = 0$	$\left[\frac{5\pi}{2}; 4\pi \right]$		$\pm \frac{2\pi}{3} + 2\pi\kappa, \kappa \in \mathbb{Z}$	$\frac{8\pi}{3}; \frac{10\pi}{3}$

46	$4 \sin^2 x - 4 \cos x - 1 = 0$	$\left[-\frac{5\pi}{2}; -\frac{3\pi}{2}\right]$		$\pm \frac{\pi}{3} + 2\pi k, k \in \mathbb{Z}$	$-\frac{7\pi}{3}; -\frac{5\pi}{3}$
47*	$2 \sin^2 x + (2 - \sqrt{2}) \cos x + \sqrt{2} - 2 = 0$	$\left[\frac{5\pi}{2}; \frac{7\pi}{2}\right]$		$2\pi k; \pm \frac{3\pi}{4} + 2\pi k, k \in \mathbb{Z}$	$\frac{11\pi}{4}; \frac{13\pi}{4}$
48	$4 \cos^2 x + 8 \sin\left(\frac{3\pi}{2} - x\right) - 5 = 0$	$\left[-\frac{7\pi}{2}; -2\pi\right]$		$\pm \frac{2\pi}{3} + 2\pi k, k \in \mathbb{Z}$	$-\frac{10\pi}{3}; -\frac{8\pi}{3}$
49	$6 \sin^2 x + 5 \sin\left(\frac{\pi}{2} - x\right) - 2 = 0$	$\left[-5\pi; -\frac{7\pi}{2}\right]$		$\pm \frac{2\pi}{3} + 2\pi k, k \in \mathbb{Z}$	$-\frac{14\pi}{3}$
50	$4 \sin^2 x + 8 \sin\left(\frac{3\pi}{2} + x\right) + 1 = 0$	$\left[-3\pi; -\frac{3\pi}{2}\right]$		$\pm \frac{\pi}{3} + 2\pi k, k \in \mathbb{Z}$	$-\frac{7\pi}{3}; -\frac{5\pi}{3}$
51	$6 \sin^2 x - 5 \sin\left(x - \frac{\pi}{2}\right) - 2 = 0$	$\left[-4\pi; -\frac{5\pi}{2}\right]$		$\pm \frac{2\pi}{3} + 2\pi k, k \in \mathbb{Z}$	$-\frac{10\pi}{3}; -\frac{8\pi}{3}$
52*	$2 \sin^2 x + 4 = 3\sqrt{3} \sin\left(\frac{3\pi}{2} + x\right)$	$\left[-\frac{5\pi}{2}; -\pi\right]$		$\pm \frac{5\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$-\frac{7\pi}{6}$
53	$\cos 2x + 3 \cos x - 1 = 0$	$\left[-4\pi; -\frac{5\pi}{2}\right]$		$\pm \frac{\pi}{3} + 2\pi k, k \in \mathbb{Z}$	$-\frac{11\pi}{3}$
54	$\cos 2x = \sin\left(\frac{3\pi}{2} - x\right)$	$\left[\frac{3\pi}{2}; \frac{5\pi}{2}\right]$		$\pi + 2\pi k; \pm \frac{\pi}{3} + 2\pi k, k \in \mathbb{Z}$	$\frac{5\pi}{3}; \frac{7\pi}{3}$
55	$2 \cos 2x = 4 \sin\left(\frac{\pi}{2} + x\right) + 1$	$\left[-\frac{5\pi}{2}; -\pi\right]$		$\pm \frac{2\pi}{3} + 2\pi k, k \in \mathbb{Z}$	$-\frac{4\pi}{3}$
56	$3 \cos 2x + 4 = 5 \sin\left(x - \frac{3\pi}{2}\right)$	$\left[-\frac{\pi}{2}; \pi\right]$		$\pm \arccos \frac{1}{3} + 2\pi k; \pm \frac{\pi}{3} + 2\pi k$	$\pm \arccos \frac{1}{3}; \pm \frac{\pi}{3}$
57	$\sin x (2 \sin x - 3 \operatorname{ctg} x) = 3$	$\left[-\frac{3\pi}{2}; -\frac{\pi}{2}\right]$		$\pm \frac{2\pi}{3} + 2\pi k, k \in \mathbb{Z}$	$-\frac{4\pi}{3}; -\frac{2\pi}{3}$
58	$6 \cos^2 x + 5 \sin x - 2 = 0$	$\left[-\frac{5\pi}{2}; -\pi\right]$		$-\frac{\pi}{6} + 2\pi k; -\frac{5\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$-\frac{13\pi}{6}$
59	$4 \cos^2 x - 8 \sin x + 1 = 0$	$\left[-3\pi; -\frac{3\pi}{2}\right]$		$\frac{\pi}{6} + 2\pi k; \frac{5\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$-\frac{11\pi}{6}$
60	$4 \cos^2 x + 4 \sin x - 1 = 0$	$\left[\pi; \frac{5\pi}{2}\right]$		$-\frac{\pi}{6} + 2\pi k; -\frac{5\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$\frac{7\pi}{6}; \frac{11\pi}{6}$
61	$6 \cos^2 x - 5 \sin x - 2 = 0$	$\left[-\frac{7\pi}{2}; -\frac{5\pi}{2}\right]$		$\frac{\pi}{6} + 2\pi k; \frac{5\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$-\frac{19\pi}{6}$
62	$4 \cos^2 x + 8 \cos\left(x - \frac{3\pi}{2}\right) + 1 = 0$	$\left[3\pi; \frac{9\pi}{2}\right]$		$\frac{\pi}{6} + 2\pi k; \frac{5\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$\frac{25\pi}{6}$
63	$6 \cos^2 x - 7 \cos\left(\frac{3\pi}{2} - x\right) - 1 = 0$	$\left[2\pi; \frac{7\pi}{2}\right]$		$-\frac{\pi}{6} + 2\pi k; -\frac{5\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$\frac{19\pi}{6}$
64	$4 \cos^2 x + 4 \cos\left(\frac{\pi}{2} + x\right) - 1 = 0$	$\left[\pi; \frac{5\pi}{2}\right]$		$\frac{\pi}{6} + 2\pi k; \frac{5\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$\frac{13\pi}{6}$
65*	$2 \cos^2 x + 1 = 2\sqrt{2} \cos\left(\frac{3\pi}{2} - x\right)$	$\left[\frac{3\pi}{2}; 3\pi\right]$		$-\frac{\pi}{4} + 2\pi k; -\frac{3\pi}{4} + 2\pi k, k \in \mathbb{Z}$	$\frac{7\pi}{4}$
66	$3 \cos 2x - 5 \sin x + 1 = 0$	$\left[\pi; \frac{5\pi}{2}\right]$		$\frac{\pi}{6} + 2\pi k; \frac{5\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$\frac{13\pi}{6}$
67	$2 \cos 2x - 8 \sin x + 3 = 0$	$\left[\frac{3\pi}{2}; 3\pi\right]$		$\frac{\pi}{6} + 2\pi k; \frac{5\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$\frac{13\pi}{6}; \frac{17\pi}{6}$
68	$3 \cos 2x + 7 \sin x + 2 = 0$	$\left[-\frac{5\pi}{2}; -\pi\right]$		$-\frac{\pi}{6} + 2\pi k; -\frac{5\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$-\frac{13\pi}{6}$

69	$3 \cos 2x + 11 \sin x + 4 = 0$	$\left[-\frac{7\pi}{2}; -2\pi \right]$		$-\frac{\pi}{6} + 2\pi k; -\frac{5\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$-\frac{17\pi}{6}; -\frac{13\pi}{6}$
70	$2 \cos 2x + 4 \sin x + 1 = 0$	$\left[\frac{5\pi}{2}; 4\pi \right]$		$-\frac{\pi}{6} + 2\pi k; -\frac{5\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$\frac{19\pi}{6}; \frac{23\pi}{6}$
71	$2 \cos 2x + 4 \cos \left(\frac{3\pi}{2} - x \right) + 1 = 0$	$\left[\frac{3\pi}{2}; 3\pi \right]$		$\frac{\pi}{6} + 2\pi k; \frac{5\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$\frac{13\pi}{6}; \frac{17\pi}{6}$
72*	$\cos 2x + 2 = \sqrt{3} \cos \left(\frac{3\pi}{2} - x \right)$	$\left[-3\pi; -\frac{3\pi}{2} \right]$		$-\frac{\pi}{3} + 2\pi k; -\frac{2\pi}{3} + 2\pi k, k \in \mathbb{Z}$	$-\frac{8\pi}{3}; -\frac{7\pi}{3}$
73*	$8 \sin^4 x + 10 \sin^2 x - 3 = 0$	$\left[-\frac{7\pi}{2}; -2\pi \right]$		$\pm \frac{\pi}{6} + \pi k, k \in \mathbb{Z}$	$-\frac{19\pi}{6}; -\frac{17\pi}{6}; -\frac{13\pi}{6}$
74*	$\frac{3}{\sin(\pi - x)} - \frac{1}{\sin^2 x} = 2$	$\left[-2\pi; -\frac{\pi}{2} \right]$		$\frac{\pi}{2} + 2\pi k; \frac{\pi}{6} + 2\pi k; \frac{5\pi}{6} + 2\pi k$	$-\frac{11\pi}{6}; -\frac{3\pi}{2}; -\frac{7\pi}{6}$
75*	$tg^2 x + 5 tg x + 6 = 0$	$\left[-2\pi; -\frac{\pi}{2} \right]$		$-\arctg 2 + \pi k; -\arctg 3 + \pi k$	$-\arctg 2 - \pi; -\arctg 3 - \pi$
76	$\frac{1}{\cos^2 x} + 3 tg x - 5 = 0$	$\left[-\pi; \frac{\pi}{2} \right]$		$\frac{\pi}{4} + \pi k; -\arctg 4 + \pi k$	$-\frac{3\pi}{4}; -\arctg 4; \frac{\pi}{4}$
77	$(1 + tg^2 x) \sin \left(\frac{\pi}{2} - 2x \right) = 1$	$\left[\frac{3\pi}{2}; 3\pi \right]$		$\pi k, k \in \mathbb{Z}$	$2\pi; 3\pi$
78	$5 tg^2 x + \frac{3}{\cos x} + 3 = 0$	$\left[\frac{5\pi}{2}; 4\pi \right]$		$\pi + 2\pi k, k \in \mathbb{Z}$	3π
79	$3 tg^2 x - \frac{5}{\cos x} + 1 = 0$	$\left[-\frac{7\pi}{2}; -2\pi \right]$		$\pm \frac{\pi}{3} + 2\pi k, k \in \mathbb{Z}$	$-\frac{7\pi}{3}$
80	$2 tg^2 x + \frac{5}{\cos x} + 4 = 0$	$\left[3\pi; \frac{9\pi}{2} \right]$		$\pm \frac{2\pi}{3} + 2\pi k, k \in \mathbb{Z}$	$\frac{10\pi}{3}$
81	$3 tg^2 x - \frac{5}{\cos x} + 5 = 0$	$\left[-3\pi; -\frac{3\pi}{2} \right]$		$2\pi k, k \in \mathbb{Z}$	-2π
82	$7 tg^2 x - \frac{1}{\cos x} + 1 = 0$	$\left[-\frac{5\pi}{2}; -\pi \right]$		$2\pi k, k \in \mathbb{Z}$	-2π
83	$tg^2 x - \frac{5}{\sin(4,5\pi - x)} + 7 = 0$	$[\pi; 2\pi]$		$\pm \frac{\pi}{3} + 2\pi k; \pm \arccos \frac{1}{3} + 2\pi k$	$2\pi - \arccos \frac{1}{3}; \frac{5\pi}{3}$
84*	$\frac{1}{tg^2 x} - \frac{1}{\sin x} = 1$	$\left[-\frac{3\pi}{2}; \frac{\pi}{2} \right]$		$\frac{\pi}{6} + 2\pi k; \frac{5\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$-\frac{7\pi}{6}; \frac{\pi}{6}$
85	$\frac{2}{tg^2(x + 5\pi)} + \frac{1}{\sin(x - 5\pi)} - 4 = 0$	$\left[-\frac{\pi}{2}; \frac{\pi}{2} \right]$		$\frac{\pi}{6} + 2\pi k; \frac{5\pi}{6} + 2\pi k, k \in \mathbb{Z}$ $-\arcsin \frac{2}{3} + 2\pi k, k \in \mathbb{Z}$ $\pi + \arcsin \frac{2}{3} + 2\pi k, k \in \mathbb{Z}$	$-\arcsin \frac{2}{3}; \frac{\pi}{6}$
86	$\sin 2x + 2 \sin x = \sqrt{3} \cos x + \sqrt{3}$	$\left[-3\pi; -\frac{3\pi}{2} \right]$		$\pi + 2\pi k; -\frac{\pi}{3} + 2\pi k; -\frac{2\pi}{3} + 2\pi k$	$-3\pi; -\frac{8\pi}{3}; -\frac{7\pi}{3}$
87	$\sin 2x + \sqrt{2} \sin x = 2 \cos x + \sqrt{2}$	$\left[\pi; \frac{5\pi}{2} \right]$		$\frac{\pi}{2} + 2\pi k; \pm \frac{3\pi}{4} + 2\pi k$	$\frac{5\pi}{4}; \frac{5\pi}{2}$
88	$\sin 2x = \sin x - 2 \cos x + 1$	$\left[\frac{3\pi}{2}; 3\pi \right]$		$-\frac{\pi}{2} + 2\pi k; \pm \frac{\pi}{3} + 2\pi k$	$\frac{3\pi}{2}; \frac{5\pi}{3}; \frac{7\pi}{3}$
89	$2 \sin 2x = 4 \cos x - \sin x + 1$	$\left[\frac{\pi}{2}; \frac{3\pi}{2} \right]$		$\frac{\pi}{2} + 2\pi k; \pm (\pi - \arccos \frac{1}{4}) + 2\pi k$	$\frac{\pi}{2}; \pi \pm \arccos \frac{1}{4}$

90	$2 \cos^3 x - \cos^2 x + 2 \cos x - 1 = 0$	$\left[2\pi; \frac{7\pi}{2} \right]$		$\pm \frac{\pi}{3} + 2\pi k, k \in \mathbb{Z}$	$\frac{7\pi}{3}$
91	$2 \cos^3 x + \sqrt{3} \cos^2 x + 2 \cos x + \sqrt{3} = 0$	$\left[-2\pi; -\frac{\pi}{2} \right]$		$\pm \frac{5\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$-\frac{7\pi}{6}; -\frac{5\pi}{6}$
92	$2 \cos^3 x - 2 \cos x + \sqrt{3} \sin^2 x = 0$	$\left[-\frac{3\pi}{2}; 0 \right]$		$\pi k; \pm \frac{\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$-\pi; -\frac{\pi}{6}; 0$
93	$2 \cos^3 x - 2 \cos x + \sin^2 x = 0$	$\left[\frac{3\pi}{2}; 3\pi \right]$		$\pi k; \pm \frac{\pi}{3} + 2\pi k, k \in \mathbb{Z}$	$\frac{5\pi}{3}; \frac{7\pi}{3}; 2\pi; 3\pi$
94	$\sqrt{2} \cos^3 x - \sqrt{2} \cos x + \sin^2 x = 0$	$\left[\frac{5\pi}{2}; 4\pi \right]$		$\pi k; \pm \frac{\pi}{4} + 2\pi k, k \in \mathbb{Z}$	$3\pi; \frac{15\pi}{4}; 4\pi$
95	$\sqrt{2} \sin^3 x - \sin^2 x + \sqrt{2} \sin x - 1 = 0$	$\left[\pi; \frac{5\pi}{2} \right]$		$\frac{\pi}{4} + 2\pi k; \frac{3\pi}{4} + 2\pi k, k \in \mathbb{Z}$	$\frac{\pi}{4}$
96	$\sqrt{2} \sin^3 x - \sqrt{2} \sin x + \cos^2 x = 0$	$\left[-\frac{5\pi}{2}; -\pi \right]$		$\frac{\pi}{2} + \pi k; \frac{\pi}{4} + 2\pi k; \frac{3\pi}{4} + 2\pi k$	$-\frac{5\pi}{2}; -\frac{7\pi}{4}; -\frac{3\pi}{2}; -\frac{5\pi}{4}$
97	$2 \sin^3 x - 2 \sin x + \cos^2 x = 0$	$\left[-\frac{7\pi}{2}; -2\pi \right]$		$\frac{\pi}{2} + \pi k; \frac{\pi}{6} + 2\pi k; \frac{5\pi}{6} + 2\pi k$	$-\frac{7\pi}{2}; -\frac{7\pi}{6}; -\frac{5\pi}{2}$
98	$4 \sin^3 x - 3 \sin x + 2 \cos 2x + 1 = 0$	$[-\pi; 0]$		$\frac{\pi}{2} + 2\pi k; \pm \frac{\pi}{3} + \pi k, k \in \mathbb{Z}$	$-\frac{2\pi}{3}; -\frac{\pi}{3}$
99	$(4 \sin^2 x + 12 \sin x + 5) \sqrt{-17 \cos x} = 0$	ОДЗ		$\frac{\pi}{2} + \pi k; -\frac{5\pi}{6} + 2\pi k, k \in \mathbb{Z}$	-
100	$(6 \cos^2 x - 5 \cos x - 4) \sqrt{-43 \sin x} = 0$	ОДЗ		$\pi k; -\frac{2\pi}{3} + 2\pi k, k \in \mathbb{Z}$	-
101	$\frac{2 \cos^3 x + 3 \cos^2 x + \cos x}{\sqrt{\operatorname{ctg} x}} = 0$	ОДЗ		$-\frac{2\pi}{3} + 2\pi k, k \in \mathbb{Z}$	-
102	$\frac{\operatorname{tg}^3 x - \operatorname{tg} x}{\sqrt{-\sin x}} = 0$	ОДЗ		$-\frac{\pi}{4} + 2\pi k; -\frac{3\pi}{4} + 2\pi k$	-
103 **	$\frac{3 \operatorname{ctg}^2 x + 4 \operatorname{ctg} x}{5 \cos^2 x - 4 \cos x} = 0$	ОДЗ		$\pi - \operatorname{arctg} \frac{3}{4} + 2\pi k, k \in \mathbb{Z}$	-
104	$\frac{2 \sin^2 x - 1}{\operatorname{tg} x + 1} = 0$	ОДЗ		$\frac{\pi}{4} + \pi k, k \in \mathbb{Z}$	-
105	$(\sqrt{2} \sin x + 1)(2 \sin x - 3) = 0$	$\operatorname{tg} x < 0$		$-\frac{\pi}{4} + 2\pi k, k \in \mathbb{Z}$	-
106	$(\operatorname{tg} x + \sqrt{3})(2 \cos x - 1) = 0$	$\sin x > 0$		$\frac{\pi}{3} + 2\pi k; \frac{2\pi}{3} + 2\pi k, k \in \mathbb{Z}$	-
107 *	$(2x^2 - 5x - 12)(2 \cos x + 1) = 0$	$\left[-\frac{\pi}{2}; \pi \right]$		$-1,5; 4; \pm \frac{2\pi}{3} + 2\pi k$	$-1,5; \frac{2\pi}{3}$
108	$\sin 2x - 2\sqrt{3} \cos^2 x - 4 \sin x + 4\sqrt{3} \cos x = 0$	$\left[\pi; \frac{5\pi}{2} \right]$		$\frac{\pi}{3} + \pi k, k \in \mathbb{Z}$	$\frac{4\pi}{3}; \frac{7\pi}{3}$
109 *	$1 + \operatorname{ctg} 2x = \frac{1}{\cos \left(\frac{3\pi}{2} - 2x \right)}$	$\left[-2\pi; -\frac{\pi}{2} \right]$		$-\frac{\pi}{4} + \pi k, k \in \mathbb{Z}$	$-\frac{5\pi}{4}$
110	$\sin^2 \left(\frac{x}{2} \right) - \cos^2 \left(\frac{x}{2} \right) = \cos 2x$	$\left[\frac{\pi}{2}; 2\pi \right]$		$\frac{\pi}{3} + \frac{2\pi k}{3}, k \in \mathbb{Z}$	$\pi; \frac{5\pi}{3}$
111	$\cos^2 x - \frac{1}{2} \sin 2x + \cos x = \sin x$	$\left[\frac{\pi}{2}; 2\pi \right]$		$\pi + 2\pi k; \frac{\pi}{4} + \pi k, k \in \mathbb{Z}$	$\pi; \frac{5\pi}{4}$
112	$\cos 4x - \cos 2x = 0$	$\left[\frac{\pi}{2}; 2\pi \right]$		$\frac{\pi k}{3}, k \in \mathbb{Z}$	$\frac{2\pi}{3}; \pi; \frac{4\pi}{3}; \frac{5\pi}{3}; 2\pi$

113	$\sqrt{3} \sin 2x + 3 \cos 2x = 0$	$\left[\frac{3\pi}{2}; 3\pi \right]$		$-\frac{\pi}{6} + \frac{\pi\kappa}{2}, \kappa \in \mathbb{Z}$	$\frac{11\pi}{6}; \frac{7\pi}{3}; \frac{17\pi}{6}$
114	$\sin x + \sin^2\left(\frac{x}{2}\right) = \cos^2\left(\frac{x}{2}\right)$	$\left[-2\pi; -\frac{\pi}{2} \right]$		$\frac{\pi}{4} + \pi\kappa, \kappa \in \mathbb{Z}$	$-\frac{7\pi}{4}; -\frac{3\pi}{4}$
115	$\cos 2x + 2 \cos^2 x - \sin 2x = 0$	$\left[\frac{3\pi}{2}; \frac{5\pi}{2} \right]$		$\frac{\pi}{4} + \pi\kappa; -\arctg 3 + \pi\kappa$	$2\pi - \arctg 3; \frac{9\pi}{4}$
116	$7 \sin^2 x + 4 \sin x \cos x - 3 \cos^2 x = 0$	$\left[\frac{3\pi}{2}; \frac{5\pi}{2} \right]$		$-\frac{\pi}{4} + \pi\kappa; \arctg \frac{3}{7} + \pi\kappa$	$\frac{7\pi}{4}; \arctg \frac{3}{7} + 2\pi$
117	$15^{\cos x} = 3^{\cos x} \cdot 5^{\sin x}$	$\left[5\pi; \frac{13\pi}{2} \right]$		$\frac{\pi}{4} + \pi\kappa, \kappa \in \mathbb{Z}$	$\frac{21\pi}{4}; \frac{25\pi}{4}$
118	$14^{\cos x} = 2^{\cos x} \cdot 7^{-\sin x}$	$\left[\frac{\pi}{2}; 2\pi \right]$		$-\frac{\pi}{4} + \pi\kappa, \kappa \in \mathbb{Z}$	$\frac{3\pi}{4}; \frac{7\pi}{4}$
119	$12^{\sin x} = 3^{\sin x} \cdot 4^{\cos x}$	$\left[2\pi; \frac{7\pi}{2} \right]$		$\frac{\pi}{4} + \pi\kappa, \kappa \in \mathbb{Z}$	$\frac{9\pi}{4}; \frac{13\pi}{4}$
120	$10^{\sin x} = 2^{\sin x} \cdot 5^{-\cos x}$	$\left[-\frac{5\pi}{2}; -\pi \right]$		$-\frac{\pi}{4} + \pi\kappa, \kappa \in \mathbb{Z}$	$-\frac{9\pi}{4}; -\frac{5\pi}{4}$
121	$21^{-\sin x} = 3^{-\sin x} \cdot 7^{\cos x}$	$\left[-\frac{3\pi}{2}; 0 \right]$		$-\frac{\pi}{4} + \pi\kappa, \kappa \in \mathbb{Z}$	$-\frac{5\pi}{4}; -\frac{\pi}{4}$
122	$20^{\cos x} = 4^{\cos x} \cdot 5^{-\sin x}$	$\left[-\frac{9\pi}{2}; -3\pi \right]$		$-\frac{\pi}{4} + \pi\kappa, \kappa \in \mathbb{Z}$	$-\frac{17\pi}{4}; -\frac{13\pi}{4}$
123 *	$(16^{\sin x})^{\cos x} = 4^{\sqrt{3} \sin x}$	$\left[3\pi; \frac{9\pi}{2} \right]$		$\pi\kappa; \pm \frac{\pi}{6} + 2\pi\kappa, \kappa \in \mathbb{Z}$	$3\pi; \frac{23\pi}{6}; 4\pi; \frac{25\pi}{6}$
124	$(36^{\sin x})^{-\cos x} = 6^{\sin x}$	$\left[-\frac{7\pi}{2}; -2\pi \right]$		$\pi\kappa; \pm \frac{2\pi}{3} + 2\pi\kappa, \kappa \in \mathbb{Z}$	$-\frac{10\pi}{3}; -3\pi; -\frac{8\pi}{3}; -2\pi$
125	$(25^{\sin x})^{-\cos x} = 5^{\sqrt{2} \sin x}$	$\left[\frac{3\pi}{2}; 3\pi \right]$		$\pi\kappa; \pm \frac{3\pi}{4} + 2\pi\kappa, \kappa \in \mathbb{Z}$	$2\pi; \frac{11\pi}{4}; 3\pi$
126	$(27^{\cos x})^{\sin x} = 3^{\frac{3 \cos x}{2}}$	$\left[-\pi; \frac{\pi}{2} \right]$		$\frac{\pi}{2} + \pi\kappa; \frac{\pi}{6} + 2\pi\kappa; \frac{5\pi}{6} + 2\pi\kappa$	$-\frac{\pi}{2}; \frac{\pi}{6}; \frac{\pi}{2}$
127	$(81^{\cos x})^{\sin x} = 9^{-\sqrt{3} \cos x}$	$\left[-2\pi; -\frac{\pi}{2} \right]$		$\frac{\pi}{2} + \pi\kappa; -\frac{\pi}{3} + 2\pi\kappa; -\frac{2\pi}{3} + 2\pi\kappa$	$-\frac{3\pi}{2}; -\frac{2\pi}{3}; -\frac{\pi}{2}$
128	$(36^{\sin x})^{\cos x} = 6^{\sqrt{2} \sin x}$	$\left[2\pi; \frac{7\pi}{2} \right]$		$\pi\kappa; \pm \frac{\pi}{4} + 2\pi\kappa, \kappa \in \mathbb{Z}$	$2\pi; \frac{9\pi}{4}; 3\pi$
129	$\left(\frac{1}{81}\right)^{\cos x} = 9^{2 \sin 2x}$	$\left[-2\pi; -\frac{\pi}{2} \right]$		$\frac{\pi}{2} + \pi\kappa; -\frac{\pi}{6} + 2\pi\kappa; -\frac{5\pi}{6} + 2\pi\kappa$	$-\frac{3\pi}{2}; -\frac{5\pi}{6}; -\frac{\pi}{2}$
130	$\left(\frac{1}{81}\right)^{\cos x} = 9^{2 \sin 2x}$	$\left[-3\pi; -2\pi \right]$		$\frac{\pi}{2} + \pi\kappa; -\frac{\pi}{6} + 2\pi\kappa; -\frac{5\pi}{6} + 2\pi\kappa$	$-\frac{17\pi}{6}; -\frac{5\pi}{2}; -\frac{13\pi}{6}$
131	$\left(\frac{1}{49}\right)^{\sin x} = 7^{2 \sin 2x}$	$\left[\frac{3\pi}{2}; 3\pi \right]$		$\pi\kappa; \pm \frac{2\pi}{3} + 2\pi\kappa, \kappa \in \mathbb{Z}$	$2\pi; \frac{8\pi}{3}; 3\pi$
132	$\left(\frac{1}{49}\right)^{\sin(x+\pi)} = 7^{2\sqrt{3} \sin\left(\frac{\pi}{2} - x\right)}$	$\left[3\pi; \frac{9\pi}{2} \right]$		$\frac{\pi}{3} + \pi\kappa, \kappa \in \mathbb{Z}$	$\frac{10\pi}{3}; \frac{13\pi}{3}$
133	$49^{\sin x} = \left(\frac{1}{7}\right)^{-\sqrt{2} \sin 2x}$	$\left[2\pi; \frac{7\pi}{2} \right]$		$\pi\kappa; \pm \frac{\pi}{4} + 2\pi\kappa, \kappa \in \mathbb{Z}$	$2\pi; \frac{9\pi}{4}; 3\pi$
134	$36^{\sin 2x} = 6^{2 \sin x}$	$\left[-\frac{7\pi}{2}; -\frac{5\pi}{2} \right]$		$\pi\kappa; \pm \frac{\pi}{3} + 2\pi\kappa, \kappa \in \mathbb{Z}$	-3π
135	$7^{2 \cos x} = 49^{\sin 2x}$	$\left[\pi; \frac{5\pi}{2} \right]$		$\frac{\pi}{2} + \pi\kappa; \frac{\pi}{6} + 2\pi\kappa; \frac{5\pi}{6} + 2\pi\kappa$	$\frac{3\pi}{2}; \frac{13\pi}{6}; \frac{5\pi}{2}$

136	$8 \cdot 16^{\sin^2 x} - 2 \cdot 4^{\cos 2x} = 63$	$\left[\frac{7\pi}{2}; 5\pi \right]$		$\pm \frac{\pi}{3} + \pi k, k \in \mathbb{Z}$	$\frac{11\pi}{3}; \frac{13\pi}{3}; \frac{14\pi}{3}$
137	$4 \cdot 16^{\sin^2 x} - 6 \cdot 4^{\cos 2x} = 29$	$\left[\frac{3\pi}{2}; 3\pi \right]$		$\pm \frac{\pi}{3} + \pi k, k \in \mathbb{Z}$	$\frac{5\pi}{3}; \frac{7\pi}{3}; \frac{8\pi}{3}$
138	$16^{\sin x} + 16^{\sin(x+\pi)} = \frac{17}{4}$	$\left[\frac{3\pi}{2}; 3\pi \right]$		$\pm \frac{\pi}{6} + \pi k, k \in \mathbb{Z}$	$\frac{11\pi}{6}; \frac{13\pi}{6}; \frac{17\pi}{6}$
139	$16^{\cos x} + 16^{\cos(\pi-x)} = \frac{17}{4}$	$\left[\pi; \frac{5\pi}{2} \right]$		$\pm \frac{\pi}{3} + \pi k, k \in \mathbb{Z}$	$\frac{4\pi}{3}; \frac{5\pi}{3}; \frac{7\pi}{3}$
140	$9 \cdot 81^{\cos x} - 28 \cdot 9^{\cos x} + 3 = 0$	$\left[\frac{5\pi}{2}; 4\pi \right]$		$\frac{2\pi k}{3}, k \in \mathbb{Z}$	$3\pi; \frac{11\pi}{3}$
141	$27 \cdot 81^{\sin x} - 12 \cdot 9^{\sin x} + 1 = 0$	$\left[\frac{3\pi}{2}; 3\pi \right]$		$-\frac{\pi}{2} + 2\pi k; -\frac{\pi}{6} + 2\pi k; -\frac{5\pi}{6} + 2\pi k$	$\frac{3\pi}{2}; \frac{11\pi}{6}$
142	$\frac{9^{\sin 2x} - 3^{2\sqrt{2}\sin x}}{\sqrt{11\sin x}} = 0$	$\left[\frac{7\pi}{2}; 5\pi \right]$		$\frac{\pi}{4} + 2\pi k, k \in \mathbb{Z}$	$\frac{17\pi}{4}$
143	$\frac{4^{\sin 2x} - 2^{2\sqrt{3}\sin x}}{\sqrt{7\sin x}} = 0$	$\left[-\frac{13\pi}{2}; -5\pi \right]$		$\frac{\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$-\frac{35\pi}{6}$
144 *	$(2 \cos^2 x + 11 \cos x + 5) \cdot \log_{18}(\sin x) = 0$	ОДЗ		$\frac{\pi}{2} + 2\pi k; \frac{2\pi}{3} + 2\pi k; k \in \mathbb{Z}$	—
145 *	$(10 \cos^2 x - 7 \cos x - 6) \cdot \log_8(-\sin x) = 0$	ОДЗ		$-\frac{\pi}{2} + 2\pi k; -\frac{2\pi}{3} + 2\pi k; k \in \mathbb{Z}$	—
146 *	$(\sqrt{3} \sin x - 2 \sin^2 x) \cdot \log_6(-\operatorname{tg} x) = 0$	ОДЗ		$-\frac{\pi}{4} + \pi k, \frac{2\pi}{3} + 2\pi k; k \in \mathbb{Z}$	—
147 *	$(2 \sin^2 x + 11 \sin x + 5) \cdot \log_{15}(-\cos x) = 0$	ОДЗ		$\pi + 2\pi k; -\frac{5\pi}{6} + 2\pi k, k \in \mathbb{Z}$	—
148	$(2 \sin^2 x + \cos x - 1) \cdot \ln(-\cos x) = 0$	ОДЗ		$\pi + 2\pi k; \pm \frac{2\pi}{3} + 2\pi k, k \in \mathbb{Z}$	—
149	$\log_4(\sin x + \sin 2x + 16) = 2$	$\left[-4\pi; -\frac{5\pi}{2} \right]$		$\pi k; \pm \frac{2\pi}{3} + 2\pi k, k \in \mathbb{Z}$	$-4\pi; -\frac{10\pi}{3}; -3\pi; -\frac{8\pi}{3}$
150	$\log_7(2 \cos^2 x + 3 \cos x - 1) = 0$	$\left[-\frac{7\pi}{2}; -2\pi \right]$		$\pm \frac{\pi}{3} + 2\pi k, k \in \mathbb{Z}$	$-\frac{7\pi}{3}$
151	$\log_6(2 \sin^2 x - 3 \sin x - 1) = 0$	$\left[-\frac{5\pi}{2}; -\pi \right]$		$-\frac{\pi}{6} + 2\pi k; -\frac{5\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$-\frac{13\pi}{6}$
152	$\log_5(\cos x - \sin 2x + 25) = 2$	$\left[2\pi; \frac{7\pi}{2} \right]$		$\frac{\pi}{2} + \pi k; \frac{\pi}{6} + 2\pi k; \frac{5\pi}{6} + 2\pi k$	$\frac{13\pi}{6}; \frac{5\pi}{2}; \frac{17\pi}{6}; \frac{7\pi}{2}$
153	$\log_2(\cos x + \sin 2x + 8) = 3$	$\left[\frac{3\pi}{2}; 3\pi \right]$		$\frac{\pi}{2} + \pi k; -\frac{\pi}{6} + 2\pi k; -\frac{5\pi}{6} + 2\pi k$	$\frac{3\pi}{2}; \frac{11\pi}{6}; \frac{5\pi}{2}$
154	$\log_3(\sin x - \sin 2x + 27) = 3$	$\left[-\frac{7\pi}{2}; -2\pi \right]$		$\pi k; \pm \frac{\pi}{3} + 2\pi k, k \in \mathbb{Z}$	$-3\pi; -\frac{7\pi}{3}; -2\pi$
155 *	$2 \log_3^2(2 \cos x) - 5 \log_3(2 \cos x) + 2 = 0$	$\left[\pi; \frac{5\pi}{2} \right]$		$\pm \frac{\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$\frac{11\pi}{6}; \frac{13\pi}{6}$
156	$2 \log_4^2(4 \sin x) - 5 \log_4(4 \sin x) + 2 = 0$	$\left[-\frac{3\pi}{2}; 0 \right]$		$\frac{\pi}{6} + 2\pi k; \frac{5\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$-\frac{7\pi}{6}$
157	$\frac{\log_2^2(\sin x) + \log_2(\sin x)}{2 \cos x - \sqrt{3}} = 0$	$\left[\frac{\pi}{2}; 2\pi \right]$		$\frac{\pi}{2} + 2\pi k; \frac{5\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$\frac{\pi}{2}; \frac{5\pi}{6}$
158 *	$\frac{\log_5(-2 \cos x)}{\sqrt{5 \operatorname{tg} x}} = 0$	ОДЗ		$-\frac{2\pi}{3} + 2\pi k, k \in \mathbb{Z}$	—

159 *	$\frac{(tgx + \sqrt{3}) \log_{13}(2 \sin^2 x)}{\log_{31}(\sqrt{2} \cos x)} = 0$	ОДЗ		$-\frac{\pi}{3} + 2\pi k, k \in \mathbb{Z}$	-
160 *	$\frac{\sin x (2 \sin x + 1)(\sqrt{2} \sin x - 1)}{\lg(tgx)} = 0$	ОДЗ		$\frac{7\pi}{6} + 2\pi k, k \in \mathbb{Z}$	-
161 *	$\frac{6 \cos^2 x - 5\sqrt{2} \cos x + 2}{\lg(tgx)} = 0$	ОДЗ		$\arccos \frac{\sqrt{2}}{3} + 2\pi k, k \in \mathbb{Z}$	-

Тренировочные работы СтатГрад и другие

24.09.15	$(tg^2 x - 1) \sqrt{13 \cos x} = 0$	$\left[-3\pi; -\frac{3\pi}{2}\right]$	$\pm \frac{\pi}{4} + 2\pi k, k \in \mathbb{Z}$	$-\frac{9\pi}{4}; -\frac{7\pi}{4}$
18.12.15	$(2 \cos^2 x + \sin x - 2) \sqrt{5 \lg x} = 0$	$\left[\pi; \frac{5\pi}{2}\right]$	$\pi k; \frac{\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$\pi; 2\pi; \frac{13\pi}{6}$
18.12.15	$(\sqrt{2} \sin^2 x + \cos x - \sqrt{2}) \sqrt{-6 \sin x} = 0$	$\left[2\pi; \frac{7\pi}{2}\right]$	$\pi k; -\frac{\pi}{4} + 2\pi k; -\frac{\pi}{2} + 2\pi k$	$2\pi; 3\pi; \frac{7\pi}{2}$
20.01.16	$\frac{2 \cos x + 1}{tgx - \sqrt{3}} = 0$	$\left[2\pi; \frac{7\pi}{2}\right]$	$\frac{2\pi}{3} + 2\pi k, k \in \mathbb{Z}$	$\frac{8\pi}{3}$
20.01.16	$\frac{\sqrt{3} tgx + 1}{2 \sin x - 1} = 0$	$\left[\frac{9\pi}{2}; 6\pi\right]$	$-\frac{\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$\frac{35\pi}{6}$
03.03.16	$\frac{5 \sin^2 x - 3 \sin x}{5 \cos x + 4} = 0$	$\left[-\frac{7\pi}{2}; -2\pi\right]$	$\pi k; \arcsin \frac{3}{5} + 2\pi k, k \in \mathbb{Z}$	$-3\pi; -2\pi$
03.03.16	$\frac{5 \sin x - 3}{5 \cos x - 4} = 0$	$\left[-\frac{15\pi}{2}; -6\pi\right]$	$\pi - \arccos \frac{4}{5} + 2\pi k, k \in \mathbb{Z}$	$-\arccos \frac{4}{5} - 7\pi$
27.04.16	$\sqrt{2} \sin^2 \left(\frac{\pi}{2} + x\right) = -\cos x$	$\left[-\frac{5\pi}{2}; -\pi\right]$	$\frac{\pi}{2} + \pi k; \pm \frac{3\pi}{4} + 2\pi k, k \in \mathbb{Z}$	$-\frac{5\pi}{2}; -\frac{3\pi}{2}; -\frac{5\pi}{4}$
27.04.16	$(\sqrt{2} \sin x + 1) \sqrt{-5 \cos x} = 0$	$\left[-5\pi; -\frac{7\pi}{2}\right]$	$\frac{\pi}{2} + \pi k; -\frac{3\pi}{4} + 2\pi k, k \in \mathbb{Z}$	$-\frac{19\pi}{4}; -\frac{9\pi}{2}; -\frac{7\pi}{2}$
СИ16 05.04.16	$\sin x (2 \sin x - 3 \operatorname{ctgx}) = 3$	$\left[-3\pi; -\frac{3\pi}{2}\right]$	$\pm \frac{2\pi}{3} + 2\pi k, k \in \mathbb{Z}$	$-\frac{8\pi}{3}$
СИ16 05.04.16	$\frac{2 \cos^2 x + 3 \sin x - 3}{\cos x} = 0$	$\left[\frac{5\pi}{2}; 4\pi\right]$	$(-1)^k \cdot \frac{\pi}{6} + \pi k, k \in \mathbb{Z}$	$\frac{17\pi}{6}$
Экзамен 16.04.16	$tg^3 x + tg^2 x - 3 tgx - 3 = 0$	$\left[2\pi; \frac{7\pi}{2}\right]$	$\pm \frac{\pi}{3} + \pi k; -\frac{\pi}{4} + \pi k, k \in \mathbb{Z}$	$\frac{7\pi}{3}; \frac{8\pi}{3}; \frac{11\pi}{4}; \frac{10\pi}{3}$
Экзамен 06.06.16	$2 \log_3^2(2 \cos x) - 5 \log_3(2 \cos x) + 2 = 0$	$\left[\pi; \frac{5\pi}{2}\right]$	$\pm \frac{\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$\frac{11\pi}{6}; \frac{13\pi}{6}$
22.09.16	$(3 tg^2 x - 1) \sqrt{-5 \cos x} = 0$	$\left[-\frac{7\pi}{2}; -2\pi\right]$	$\pm \frac{5\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$-\frac{19\pi}{6}; -\frac{17\pi}{6}$
20.12.16	$\frac{2 \cos^2 x - \sqrt{3} \cos x}{\log_4(\sin x)} = 0$	$\left[-3\pi; -\frac{3\pi}{2}\right]$	$\frac{\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$-\frac{11\pi}{6}$
20.12.16	$8 \cdot 16^{\sin^2 x} - 2 \cdot 4^{\cos 2x} = 63$	$\left[\frac{7\pi}{2}; 5\pi\right]$	$\frac{\pi}{3} + \pi k; \frac{2\pi}{3} + \pi k, k \in \mathbb{Z}$	$\frac{11\pi}{3}; \frac{13\pi}{3}; \frac{14\pi}{3}$
26.01.17	$\frac{4^{\sin 2x} - 2^{2\sqrt{3} \sin x}}{\sqrt{7 \sin x}} = 0$	$\left[-\frac{13\pi}{2}; -5\pi\right]$	$\frac{\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$-\frac{35\pi}{6}$

26.01.17	$\frac{\sqrt{3} \operatorname{tg}^2 x - \operatorname{tg} x}{\sqrt{-5 \cos x}} = 0$	$\left[-3\pi; -\frac{3\pi}{2}\right]$	$\pi + 2\pi k; \frac{7\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$-3\pi; -\frac{17\pi}{6}$
06.03.17	$\frac{\log_2^2(\sin x) + \log_2(\sin x)}{2 \cos x - \sqrt{3}} = 0$	$\left[\frac{\pi}{2}; 2\pi\right]$	$\frac{\pi}{2} + 2\pi k; \frac{5\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$\frac{\pi}{2}; \frac{5\pi}{6}$
06.03.17	$\frac{1}{\cos^2 x} + \frac{3}{\sin\left(\frac{\pi}{2} + x\right)} + 2 = 0$	$\left[\frac{3\pi}{2}; 3\pi\right]$	$\pi + 2\pi k; \pm \frac{2\pi}{3} + 2\pi k, k \in \mathbb{Z}$	$\frac{8\pi}{3}; 3\pi$
21.04.17	$\frac{1}{\sin^2 x} + \frac{1}{\cos\left(\frac{7\pi}{2} + x\right)} = 2$	$\left[-\frac{5\pi}{2}; -\pi\right]$	$\frac{\pi}{2} + 2\pi k; -\frac{5\pi}{6} + 2\pi k; -\frac{\pi}{6} + 2\pi k$	$-\frac{13\pi}{6}; -\frac{3\pi}{2}$
Экзамен 14.04.17	$\cos^2(\pi - x) - \sin\left(x + \frac{3\pi}{2}\right) = 0$	$\left[\frac{5\pi}{2}; 4\pi\right]$	$\frac{\pi}{2} + \pi k; \pi + 2\pi k, k \in \mathbb{Z}$	$\frac{5\pi}{2}; 3\pi; \frac{7\pi}{2}$
Экзамен 02.06.17	$\log_4(2^{2x} - \sqrt{3} \cos x - 6 \sin^2 x) = x$	$\left[\frac{5\pi}{2}; 4\pi\right]$	$\pm \frac{5\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$\frac{17\pi}{6}; \frac{19\pi}{6}$
Экзамен 02.06.17	$3 \log_8^2(\sin x) - 5 \log_8(\sin x) - 2 = 0$	$\left[-\frac{7\pi}{2}; -2\pi\right]$	$\frac{\pi}{6} + 2\pi k; \frac{5\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$-\frac{19\pi}{6}$
Экзамен 02.06.17	$8 \cdot 16^{\cos x} - 6 \cdot 4^{\cos x} + 1 = 0$	$\left[\frac{3\pi}{2}; 3\pi\right]$	$\pi + 2\pi k; \pm \frac{2\pi}{3} + 2\pi k, k \in \mathbb{Z}$	$\frac{8\pi}{3}; 3\pi$
Экзамен 28.06.17	$2x \cos x - 8 \cos x + x - 4 = 0$	$\left[-\frac{\pi}{2}; \pi\right]$	$4; \pm \frac{2\pi}{3} + 2\pi k, k \in \mathbb{Z}$	$\frac{2\pi}{3}$
21.09.17	$\frac{1}{\cos^2 x} + \frac{1}{\sin\left(\frac{7\pi}{2} - x\right)} = 2$	$\left[\frac{17\pi}{2}; 10\pi\right]$	$\pi + 2\pi k; \pm \frac{\pi}{3} + 2\pi k, k \in \mathbb{Z}$	$9\pi; \frac{29\pi}{3}$
21.09.17	$4 \sin\left(x - \frac{7\pi}{2}\right) = \frac{3}{\cos x}$	$\left[-\frac{13\pi}{2}; -5\pi\right]$	$\pm \frac{\pi}{6} + \pi k, k \in \mathbb{Z}$	$-\frac{37\pi}{6}; -\frac{35\pi}{6}; -\frac{31\pi}{6}$
21.12.17	$\sin 2x + 2 \cos^2 x + \cos 2x = 0$	$\left[-\frac{9\pi}{2}; -3\pi\right]$	$-\frac{\pi}{4} + \pi k; \operatorname{arctg} 3 + \pi k, k \in \mathbb{Z}$	$-\frac{17\pi}{4}; -\frac{13\pi}{4}; -4\pi + \operatorname{arctg} 3$
21.12.17	$4 \sin^4 2x + 3 \cos 4x = 1$	$\left[\frac{3\pi}{2}; 2\pi\right]$	$\frac{\pi}{4} + \frac{\pi k}{2}; \frac{\pi}{8} + \frac{\pi k}{4}, k \in \mathbb{Z}$	$\frac{13\pi}{8}; \frac{7\pi}{4}; \frac{15\pi}{8}$
25.01.18	$2 \sin(\pi + x) \cdot \sin\left(\frac{\pi}{2} + x\right) = \sin x$	$\left[3\pi; \frac{9\pi}{2}\right]$	$\pi k; \pm \frac{2\pi}{3} + 2\pi k, k \in \mathbb{Z}$	$3\pi; \frac{10\pi}{3}; 4\pi$
06.03.18	$\sin 2x - 2\sqrt{3} \cos\left(x + \frac{7\pi}{6}\right) = 3 \cos x$	$\left[-\frac{3\pi}{2}; 0\right]$	$\pi k; \pm \frac{\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$-\pi; -\frac{\pi}{6}; 0$
06.03.18	$\sin 2x - 2 \cos\left(x - \frac{4\pi}{3}\right) = \sqrt{3} \sin x$	$\left[-\frac{\pi}{2}; \pi\right]$	$\frac{\pi}{2} + \pi k; -\frac{\pi}{6} + 2\pi k; -\frac{5\pi}{6} + 2\pi k$	$-\frac{\pi}{2}; -\frac{\pi}{6}; \frac{\pi}{2}$
18.04.18	$2^{\sin^2 x} + 2^{\cos^2 x} = 3$	$\left[-\frac{5\pi}{2}; -\pi\right]$	$\frac{\pi k}{2}, k \in \mathbb{Z}$	$-\frac{5\pi}{2}; -2\pi; -\frac{3\pi}{2}; -\pi$
С16 04.04.18	$\sin\left(\frac{7\pi}{2} + x\right) + 2 \cos 2x = 1$	$[3\pi; 4\pi]$	$2\pi k; \pm(\pi - \arccos \frac{3}{4}) + 2\pi k$	$4\pi; 3\pi + \arccos \frac{3}{4}$
С16 04.04.18	$\cos\left(\frac{5\pi}{2} - x\right) - 2 \cos 2x = 1$	$\left[\frac{5\pi}{2}; \frac{7\pi}{2}\right]$	$-\frac{\pi}{2} + 2\pi k; (-1)^k \cdot \arcsin \frac{3}{4} + \pi k$	$\frac{7\pi}{2}; 3\pi - \arcsin \frac{3}{4}$
Экзамен 30.03.18	$\frac{\sin x}{\cos^2 x} = 4 \sin^2 \frac{x}{2}$	$\left[-4\pi; -\frac{5\pi}{2}\right]$	$2\pi k; \frac{\pi}{2} + 2\pi k, k \in \mathbb{Z}$	$-4\pi; -\frac{7\pi}{2}$
Экзамен 01.06.18	$\sin x + 2 \sin\left(2x + \frac{\pi}{6}\right) = \sqrt{3} \sin 2x + 1$	$\left[-\frac{7\pi}{2}; -2\pi\right]$	$\pi k; \frac{\pi}{6} + 2\pi k; \frac{5\pi}{6} + 2\pi k, k \in \mathbb{Z}$	$-\frac{19\pi}{6}; -3\pi; -2\pi$

Экзамен 01.06.18	$2 \sin \left(2x + \frac{\pi}{3} \right) - \sqrt{3} \sin x = \sin 2x + \sqrt{3}$	$\left[2\pi; \frac{7\pi}{2} \right]$	$\pi\kappa; -\frac{\pi}{6} + 2\pi\kappa; -\frac{5\pi}{6} + 2\pi\kappa$	$2\pi; 3\pi; \frac{19\pi}{6}$
Экзамен 01.06.18	$\sqrt{2} \sin \left(2x + \frac{\pi}{4} \right) - \sqrt{2} \sin x = \sin 2x + 1$	$\left[\frac{3\pi}{2}; 3\pi \right]$	$\pi\kappa; -\frac{\pi}{4} + 2\pi\kappa; -\frac{3\pi}{4} + 2\pi\kappa$	$\frac{7\pi}{4}; 2\pi; 3\pi$
Экзамен 01.06.18	$\sqrt{6} \sin^2 x + \cos x = 2 \sin \left(x + \frac{\pi}{6} \right)$	$\left[3\pi; \frac{9\pi}{2} \right]$	$\pi\kappa; \frac{\pi}{4} + 2\pi\kappa; \frac{3\pi}{4} + 2\pi\kappa$	$3\pi; 4\pi; \frac{17\pi}{4}$
Экзамен 25.06.18	$2 \cos x - \sqrt{3} \sin^2 x = 2 \cos^3 x$	$\left[-\frac{7\pi}{2}; -2\pi \right]$	$\pi\kappa; \pm \frac{\pi}{6} + 2\pi\kappa, \kappa \in \mathbb{Z}$	$-3\pi; -\frac{13\pi}{6}; -2\pi$
20.09.18	$8 \sin^2 \left(\frac{7\pi}{12} + x \right) - 2\sqrt{3} \cos 2x = 5$	$\left[-\frac{7\pi}{2}; -\frac{5\pi}{2} \right]$	$-\frac{\pi}{12} + \pi\kappa; -\frac{5\pi}{12} + \pi\kappa, \kappa \in \mathbb{Z}$	$-\frac{41\pi}{12}; -\frac{37\pi}{12}$
20.09.18	$\sqrt{2} \sin 2x + 4 \cos^2 \left(\frac{3\pi}{8} + x \right) = 2 + \sqrt{2}$	$\left[\pi; \frac{5\pi}{2} \right]$	$\frac{\pi}{2} + \pi\kappa, \kappa \in \mathbb{Z}$	$\frac{3\pi}{2}; \frac{5\pi}{2}$
20.09.18	$1 - 4 \cos^2 \left(x - \frac{5\pi}{12} \right) = \sqrt{3} \cos 2x$	$\left[-\frac{9\pi}{2}; -3\pi \right]$	$-\frac{\pi}{4} + \pi\kappa, \kappa \in \mathbb{Z}$	$-\frac{17\pi}{4}; -\frac{13\pi}{4}$
20.09.18	$4 \sin^2 \left(x + \frac{7\pi}{8} \right) + \sqrt{2} \sin 2x = 1$	$\left[\frac{9\pi}{2}; 6\pi \right]$	$\pm \frac{\pi}{8} + \pi\kappa, \kappa \in \mathbb{Z}$	$\frac{39\pi}{8}; \frac{41\pi}{8}; \frac{47\pi}{8}$
20.12.18	$\frac{7}{1 - \cos^2 x} + \frac{9}{\sin x} = 10$	$\left[-3\pi; -\frac{3\pi}{2} \right]$	$-\frac{\pi}{6} + 2\pi\kappa; -\frac{5\pi}{6} + 2\pi\kappa, \kappa \in \mathbb{Z}$	$-\frac{17\pi}{6}; -\frac{13\pi}{6}$
24.01.19				