

$$\sin 2\alpha = 2 \sin \alpha \cos \alpha;$$

$$\cos 2\alpha = \cos^2 \alpha - \sin^2 \alpha;$$

$$\cos 2\alpha = 1 - 2 \sin^2 \alpha; \quad \cos 2\alpha = 2 \cos^2 \alpha - 1;$$

$$\operatorname{tg} 2\alpha = \frac{2 \operatorname{tg} \alpha}{1 - \operatorname{tg}^2 \alpha}.$$

**Задача 3** Упростить выражение  $\frac{\sin \alpha \cos \alpha}{1 - 2 \sin^2 \alpha}$ .

$$\begin{aligned} \frac{\sin \alpha \cos \alpha}{1 - 2 \sin^2 \alpha} &= \frac{2 \sin \alpha \cos \alpha}{2(\sin^2 \alpha + \cos^2 \alpha - 2 \sin^2 \alpha)} = \\ &= \frac{\sin 2\alpha}{2(\cos^2 \alpha - \sin^2 \alpha)} = \frac{\sin 2\alpha}{2 \cos 2\alpha} = \frac{1}{2} \operatorname{tg} 2\alpha. \end{aligned}$$

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Вычислить, не используя калькулятор (500—502).

1)  $2 \sin 15^\circ \cdot \cos 15^\circ;$

2)  $\cos^2 15^\circ - \sin^2 15^\circ;$

3)  $\frac{2 \operatorname{tg} 15^\circ}{1 - \operatorname{tg}^2 15^\circ};$

4)  $(\cos 75^\circ - \sin 75^\circ)^2.$

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1)  $2 \sin \frac{\pi}{8} \cdot \cos \frac{\pi}{8};$

2)  $\cos^2 \frac{\pi}{8} - \sin^2 \frac{\pi}{8};$

3)  $\frac{2 \operatorname{tg} \frac{\pi}{8}}{1 - \operatorname{tg}^2 \frac{\pi}{8}};$

4)  $\frac{\sqrt{2}}{2} - \left( \cos \frac{\pi}{8} + \sin \frac{\pi}{8} \right)^2.$

$\alpha$	$0^\circ$	$30^\circ$	$45^\circ$	$60^\circ$	$90^\circ$	$120^\circ$	$135^\circ$	$150^\circ$	$180^\circ$	$210^\circ$	$225^\circ$	$240^\circ$	$270^\circ$	$300^\circ$	$315^\circ$	$330^\circ$	$360^\circ$
$\sin \alpha$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{1}{2}$	0
$\cos \alpha$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{1}{2}$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
$\operatorname{tg} \alpha$	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	-	$-\sqrt{3}$	-1	$-\frac{\sqrt{3}}{3}$	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	-	$-\sqrt{3}$	-1	$-\frac{\sqrt{3}}{3}$	0
$\operatorname{ctg} \alpha$	-	$\sqrt{3}$	1	$\frac{\sqrt{3}}{3}$	0	$-\frac{\sqrt{3}}{3}$	-1	$-\sqrt{3}$	-	$\sqrt{3}$	1	$\frac{\sqrt{3}}{3}$	0	$-\frac{\sqrt{3}}{3}$	-1	$-\sqrt{3}$	-
$\alpha$	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	$\pi$	$\frac{7\pi}{6}$	$\frac{5\pi}{4}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{7\pi}{4}$	$\frac{11\pi}{6}$	$2\pi$