

VII. Тригонометрические выражения.

Блок №1.

Вычислить:

1. $4 \sin 15^\circ \cos 15^\circ$;
2. $2\sqrt{2} \sin \frac{\pi}{8} \cos \frac{\pi}{8}$;
3. $4 \sin 165^\circ \cos 165^\circ$;
4. $\sin 75^\circ \sin 15^\circ$;
5. $\sin 105^\circ \cos 105^\circ$;
6. $\frac{3}{8} - 6 \sin^2 \frac{\pi}{12} \cos^2 \frac{\pi}{12}$;
7. $\frac{\sqrt{2}}{2} - \left(\cos \frac{\pi}{8} + \sin \frac{\pi}{8} \right)^2$;
8. $\sqrt{2} \sin \frac{\pi}{16} \cos^3 \frac{\pi}{16} - \sqrt{2} \sin^3 \frac{\pi}{16} \cos \frac{\pi}{16}$;
9. $\frac{\sin 26^\circ + \sin 34^\circ}{\cos^2 2^\circ - \cos^2 88^\circ}$;
10. $\frac{\sin^2 27^\circ - \sin^2 63^\circ}{\sin 18^\circ \cos 18^\circ}$;
11. $\frac{\frac{\sqrt{2}}{2} (\cos 5^\circ + \sin 5^\circ)}{2 \sin 25^\circ \cos 25^\circ}$;
12. $\frac{4 \sin 5^\circ \cos 5^\circ}{\frac{\sqrt{2}}{2} (\sin 55^\circ - \cos 55^\circ)}$;
13. $\frac{\cos 70^\circ \cos 10^\circ + \cos 80^\circ \cos 20^\circ}{\cos 38^\circ \cos 8^\circ + \cos 82^\circ \cos 22^\circ}$;
14. $\frac{\cos 66^\circ \cos 10^\circ + \cos 84^\circ \cos 24^\circ}{\cos 65^\circ \cos 5^\circ + \cos 84^\circ \cos 25^\circ}$;
15. $\frac{1}{4 \cos \frac{\pi}{12} \sin \frac{3\pi}{8}}$;
16. $\frac{1}{2\sqrt{2} \sin \frac{\pi}{8} \sin \frac{3\pi}{8}}$;
17. $\frac{\sqrt{2} \sin 60^\circ}{\cos 75^\circ + \sin 75^\circ}$;
18. $\frac{\sin 91^\circ - \sin 1^\circ}{9\sqrt{2} \cos 46^\circ + \sqrt{2} \sin 44^\circ}$;
19. $\frac{33 \sin 21^\circ \cos 21^\circ \cos 42^\circ}{\sin 96^\circ}$;
20. $\frac{8 \sin 9^\circ \cos 9^\circ \cos 18^\circ}{\cos 54^\circ}$;
21. $96\sqrt{3} \sin \frac{\pi}{48} \cos \frac{\pi}{48} \cos \frac{\pi}{24} \cos \frac{\pi}{12} \cos \frac{\pi}{6}$;
22. $\frac{4 \sin 20^\circ \sin 50^\circ \sin 70^\circ}{\sin 80^\circ}$;
23. $16 \cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ$;
24. $8 \cos \frac{4\pi}{9} \cos \frac{2\pi}{9} \cos \frac{\pi}{9}$;
25. $2 \sin 10^\circ \sin 70^\circ + \cos 80^\circ$;
26. $8 \sin 10^\circ \sin 50^\circ \sin 70^\circ$;
27. $\cos 70^\circ + 2 \sin 65^\circ \sin 15^\circ$;
28. $\frac{\sin 70^\circ + \sin 10^\circ}{\cos 10^\circ - \cos 70^\circ}$;
29. $\frac{\sin 110^\circ - \sin 10^\circ}{\sin 110^\circ + \cos 10^\circ}$;
30. $\sin 20^\circ + \sin 40^\circ - \cos 10^\circ$.

Блок №2.*Вычислить:*

1. $\cos \alpha$, если $\sin \alpha = \frac{3}{5}$, $\frac{\pi}{2} < \alpha < \pi$;
2. $\sin \alpha$, если $\operatorname{tg} \alpha = -\frac{5}{12}$, $\cos \alpha > 0$;
3. $\sin 2\alpha$, если $\sin \alpha + \cos \alpha = \frac{2}{3}$;
4. $\cos\left(\frac{\pi}{3} - \alpha\right)$, если $\sin \alpha = \frac{5}{13}$, $\alpha \in \left(\frac{\pi}{2}; \pi\right)$;
5. $\operatorname{tg}\left(\alpha + \frac{\pi}{4}\right)$, если $\operatorname{tg} \alpha = 2$;
6. $\cos \alpha$, если $\sin\left(\alpha + \frac{\pi}{6}\right) = -\frac{13}{14}$ и $\alpha - \frac{\pi}{3}$ - угол третьей четверти;
7. $\operatorname{tg}^4 \alpha + \operatorname{ctg}^4 \alpha$, если $\operatorname{tg} \alpha - \operatorname{ctg} \alpha = a$;
8. $\sin^6 \alpha + \cos^6 \alpha$, если $\sin \alpha + \cos \alpha = n$;
9. $\operatorname{tg} \alpha$, если $\operatorname{tg} 2\alpha = \frac{4}{3}$;
10. $\sin 2\alpha$, если $\cos 2\alpha \geq -\frac{1}{8}$ и $\sin \alpha \geq \frac{3}{4}$.

Блок №3.*Вычислить:*

- | | |
|---|--|
| 1. $\sin \arcsin \frac{1}{3}$; | 11. $\sin \arccos \frac{3}{5}$; |
| 2. $\cos \arccos \frac{2}{7}$; | 12. $\cos \arcsin \frac{4}{5}$; |
| 3. $\sin \arcsin\left(-\frac{11}{12}\right)$; | 13. $\cos \operatorname{arctg} \frac{5}{12}$; |
| 4. $\operatorname{ctg} \operatorname{arctg}\left(-\frac{20}{11}\right)$; | 14. $\sin \operatorname{arctg} \frac{21}{20}$; |
| 5. $\arcsin \sin \frac{5\pi}{9}$; | 15. $\sin 2 \arccos \frac{3}{5}$; |
| 6. $\arcsin \sin \frac{10\pi}{9}$; | 16. $\cos 2 \arcsin \frac{4}{5}$; |
| 7. $\arccos \cos \frac{6\pi}{7}$; | 17. $\left(\operatorname{ctg}\left(\arcsin \frac{1}{8}\right)\right)^{-2}$; |
| 8. $\arccos \cos \frac{13\pi}{7}$; | 18. $\left(\sin\left(\operatorname{arctg} \frac{1}{5}\right)\right)^{-2}$; |
| 9. $\operatorname{arctg} \operatorname{tg} \frac{4\pi}{5}$; | 19. $25 \cos\left(\arcsin \frac{3}{5} + \arccos \frac{4}{5}\right)$; |
| 10. $\operatorname{arctg} \operatorname{tg} \frac{9\pi}{5}$; | 20. $7\sqrt{33} \sin\left(\arccos \frac{4}{7}\right)$. |