

1. Тригонометрические преобразования.

$$\sin^2 \alpha + \cos^2 \alpha = 1; \operatorname{tg} \alpha = \frac{\sin \alpha}{\cos \alpha}; 1 + \operatorname{tg}^2 \alpha = \frac{1}{\cos^2 \alpha}; \operatorname{ctg} \alpha = \frac{\cos \alpha}{\sin \alpha}; 1 + \operatorname{ctg}^2 \alpha = \frac{1}{\sin^2 \alpha};$$

$$\sin(\alpha \pm \beta) = \sin \alpha \cos \beta \pm \cos \alpha \sin \beta; \cos(\alpha \pm \beta) = \cos \alpha \cos \beta \mp \sin \alpha \sin \beta;$$

$$1 + \cos \alpha = 2 \cos^2 \frac{\alpha}{2}; 1 - \cos \alpha = 2 \sin^2 \frac{\alpha}{2}; \operatorname{tg} \frac{\alpha}{2} = \frac{1 - \cos \alpha}{\sin \alpha};$$

$$\cos^2 \alpha = \frac{1}{2}(1 + \cos 2\alpha); \sin^2 \alpha = \frac{1}{2}(1 - \cos 2\alpha); \operatorname{tg}^2 \alpha = \frac{1 - \cos 2\alpha}{1 + \cos 2\alpha};$$

$$\sin \alpha = \frac{2 \operatorname{tg} \frac{\alpha}{2}}{1 + \operatorname{tg}^2 \frac{\alpha}{2}}; \cos \alpha = \frac{1 - \operatorname{tg}^2 \frac{\alpha}{2}}{1 + \operatorname{tg}^2 \frac{\alpha}{2}}; \operatorname{tg} \alpha = \frac{2 \operatorname{tg} \frac{\alpha}{2}}{1 - \operatorname{tg}^2 \frac{\alpha}{2}}; \operatorname{ctg} \alpha = \frac{1 - \operatorname{tg}^2 \frac{\alpha}{2}}{2 \operatorname{tg} \frac{\alpha}{2}};$$

$$\sin \alpha \pm \sin \beta = 2 \sin \frac{\alpha \pm \beta}{2} \cos \frac{\alpha \mp \beta}{2}; \cos \alpha + \cos \beta = 2 \cos \frac{\alpha + \beta}{2} \cos \frac{\alpha - \beta}{2};$$

$$\cos \alpha - \cos \beta = -2 \sin \frac{\alpha - \beta}{2} \sin \frac{\alpha + \beta}{2};$$

$$\sin \alpha \pm \cos \beta = \sin \alpha \pm \sin \left(\frac{\pi}{2} + \beta \right) = 2 \sin \left(\frac{\alpha \pm \beta}{2} \pm \frac{\pi}{4} \right) \cos \left(\frac{\alpha \mp \beta}{2} \mp \frac{\pi}{4} \right);$$

$$\sin \alpha \cos \beta = \frac{1}{2}(\sin(\alpha + \beta) + \sin(\alpha - \beta)); \cos \alpha \cos \beta = \frac{1}{2}(\cos(\alpha + \beta) + \cos(\alpha - \beta));$$

$$\sin \alpha \sin \beta = \frac{1}{2}(\cos(\alpha - \beta) - \cos(\alpha + \beta)).$$

2. Асимптотические формулы

$$\sin t = t + o(t^2), \quad t \rightarrow 0; \quad \cos t = 1 - \frac{1}{2}t^2 + o(t^3), \quad t \rightarrow 0;$$

$$\operatorname{tg} t = t + o(t^2), \quad t \rightarrow 0; \quad \operatorname{arctg} t = t + o(t^2), \quad t \rightarrow 0;$$

$$\operatorname{arcsin} t = t + o(t^2), \quad t \rightarrow 0;$$

$$a^t = 1 + t \ln a + o(t), \quad t \rightarrow 0;$$

$$\log_a(1+t) = \frac{1}{\ln a} t + o(t), \quad t \rightarrow 0;$$

$$(1+t)^\alpha = 1 + \alpha t + o(t), \quad t \rightarrow 0.$$