Стр.70, Зад.4.

$a.\sin 180^0 + b.\cos 90^0 = a.0 + b.0 = 0$.

Стр.70, Зад.5.

$a^2.\operatorname{tg} 0^0 - b^2.\cos 180^0 = a^2.0 - b^2.(-1) = 0 + b^2 = b^2$.

Стр.71, Зад.6.

$\sin 60^0.\cos\left(180^0 - 30^0\right) - \sin 30^0.\operatorname{tg} 45^0 = \sin 60^0.\left(-\cos 30^0\right) - \sin 30^0.\operatorname{tg} 45^0 =$

$= \frac{\sqrt{3}}{2}.\left(-\frac{\sqrt{3}}{2}\right) - \frac{1}{2}.1 = -\frac{3}{4} - \frac{1}{2} = -\frac{5}{4}.$

Стр.71, Зад.7.

$\left(\sin^2 45^0 - \cos^2 30^0\right).\operatorname{tg}\left(180^0 - 60^0\right) = \left(\sin^2 45^0 - \cos^2 30^0\right)\left(-\operatorname{tg} 60^0\right) =$

$\left[\left(\frac{\sqrt{2}}{2}\right)^2 - \left(\frac{\sqrt{3}}{2}\right)^2\right]\left(-\sqrt{3}\right) = \left(\frac{2}{4} - \frac{3}{4}\right)\left(-\sqrt{3}\right) = \left(-\frac{1}{4}\right)\left(-\sqrt{3}\right) = \frac{\sqrt{3}}{4}.$

Стр.71, Зад.8. $\cos^2 60^0 + 1 - \sin^2\left(180^0 - 45^0\right) = \cos^2 60^0 + 1 - \sin^2 45^0 =$

$= \left(\frac{1}{2}\right)^2 + 1 - \left(\frac{\sqrt{2}}{2}\right)^2 = \frac{1}{4} + 1 - \frac{2}{4} = \frac{1+4-2}{4} = \frac{3}{4}.$

Стр.71, Зад.9.

$\frac{1}{2}.\cos 30^0 - \frac{\sqrt{3}}{2}.\operatorname{cotg}\left(180^0 - 45^0\right) = \frac{1}{2}.\cos 30^0 - \frac{\sqrt{3}}{2}\left(-\operatorname{cotg} 45^0\right) =$

$= \frac{1}{2}.\frac{\sqrt{3}}{2} - \frac{\sqrt{3}}{2}(-1) = \frac{\sqrt{3}}{4} + \frac{\sqrt{3}}{2} = \frac{3\sqrt{3}}{4}.$

Стр.71, Зад.10. $\sin\left(180^0 - 60^0\right).\operatorname{cotg}\left(180^0 - 30^0\right) + \sin 60^0.\operatorname{tg}\left(180^0 - 30^0\right) =$

$= \sin 60^0\left(-\operatorname{cotg} 30^0\right) + \sin 60^0\left(-\operatorname{tg} 30^0\right) = \frac{\sqrt{3}}{2}\left(-\sqrt{3}\right) + \frac{\sqrt{3}}{2}\left(-\frac{\sqrt{3}}{3}\right) =$

$= -\frac{3}{2} - \frac{3}{6} = -\frac{3}{2} - \frac{1}{2} = -\frac{4}{2} = -2.$

Стр.71, Зад.11.

$\left[\sin^2\left(180^0 - 30^0\right) + \operatorname{tg}^2\left(180^0 - 30^0\right)\right]\cos\left(180^0 - 60^0\right) =$

$= \left[\sin^2 30^0 + \left(-\operatorname{tg} 30^0\right)^2\right]\left(-\cos 60^0\right) = \left[\left(\frac{1}{2}\right)^2 + \left(-\frac{\sqrt{3}}{3}\right)^2\right]\left(-\frac{1}{2}\right) =$

$= \left(\frac{1}{4} + \frac{3}{9}\right)\left(-\frac{1}{2}\right) = \left(\frac{1}{4} + \frac{1}{3}\right)\left(-\frac{1}{2}\right) = \frac{7}{12}\left(-\frac{1}{2}\right) = -\frac{7}{24}.$

Стр.71, Зад.12. $\cos^2\left(180^0 - 45^0\right) + 1 - \sin^2 60^0 = \left(-\cos 45^0\right)^2 + 1 - \sin^2 60^0 =$

$= \left(-\frac{\sqrt{2}}{2}\right)^2 + 1 - \left(\frac{\sqrt{3}}{2}\right)^2 = \frac{2}{4} + 1 - \frac{3}{4} = 1 - \frac{1}{4} = \frac{3}{4}.$

Стр.71, Зад.13. $\sqrt{3}.\operatorname{cotg}\left(180^0 - 60^0\right) + 2.\sin^2\left(180^0 - 45^0\right) =$

$= \sqrt{3}.\left(-\operatorname{cotg} 60^0\right) + 2.\sin^2 45^0 = -\sqrt{3}.\frac{\sqrt{3}}{3} + 2.\left(\frac{\sqrt{2}}{2}\right)^2 = -1 + 2.\frac{2}{4} = -1 + 1 = 0.$

Стр.71, Зад.14.

$\alpha \in \left(0^0; 90^0\right);\ \sin\alpha = \frac{12}{13};\ \cos\alpha = \sqrt{1 - \sin^2\alpha} = \sqrt{1 - \left(\frac{12}{13}\right)^2} = \sqrt{1 - \frac{144}{169}} =$

$= \sqrt{\frac{169-144}{169}} = \sqrt{\frac{25}{169}} = \frac{5}{13};\ \operatorname{tg}\alpha = \frac{\sin\alpha}{\cos\alpha} = \frac{\frac{12}{13}}{\frac{5}{13}} = \frac{12}{5};\ \operatorname{cotg}\alpha = \frac{1}{\operatorname{tg}\alpha} = \frac{5}{12}.$

Стр.71, Зад.15.

$$\alpha\in\left(90^0;180^0\right);\ \sin\alpha=\frac{12}{13};\ \cos\alpha=-\sqrt{1-\sin^2\alpha}=-\sqrt{1-\left(\frac{12}{13}\right)^2}=-\sqrt{1-\frac{144}{169}}=$$

$$=-\sqrt{\frac{169-144}{169}}=-\sqrt{\frac{25}{169}}=-\frac{5}{13};\ \operatorname{tg}\alpha=\frac{\sin\alpha}{\cos\alpha}=\frac{\frac{12}{13}}{-\frac{5}{13}}=-\frac{12}{5};\ \operatorname{cotg}\alpha=\frac{1}{\operatorname{tg}\alpha}=-\frac{5}{12}.$$

Стр.71, Зад.16.

$$\cos\alpha=-\frac{7}{25};\ \sin\alpha=\sqrt{1-\cos^2\alpha}=\sqrt{1-\left(-\frac{7}{25}\right)^2}=\sqrt{1-\frac{49}{625}}=\sqrt{\frac{625-49}{625}}=$$

$$=\sqrt{\frac{576}{625}}=\frac{24}{25};\ \operatorname{tg}\alpha=\frac{\sin\alpha}{\cos\alpha}=\frac{\frac{24}{25}}{-\frac{7}{25}}=-\frac{24}{7};\ \operatorname{cotg}\alpha=\frac{1}{\operatorname{tg}\alpha}=-\frac{7}{24}.$$

Стр.71, Зад.17.

$$\alpha\in\left(90^0;180^0\right);\ \sin\alpha=\frac{1}{2};\ \cos\alpha=-\sqrt{1-\sin^2\alpha}=-\sqrt{1-\left(\frac{1}{2}\right)^2}=-\sqrt{1-\frac{1}{4}}=$$

$$=-\sqrt{\frac{3}{4}}=-\frac{\sqrt{3}}{2};\ \operatorname{tg}\alpha=\frac{\sin\alpha}{\cos\alpha}=\frac{\frac{1}{2}}{-\frac{\sqrt{3}}{2}}=-\frac{1}{\sqrt{3}}=-\frac{\sqrt{3}}{3};\ \operatorname{cotg}\alpha=\frac{1}{\operatorname{tg}\alpha}=-\sqrt{3}.$$

Стр.71, Зад.18. $\operatorname{cotg}\alpha=\frac{\cos\alpha}{\sin\alpha}=\frac{2}{5}$, тогава $\cos\alpha=\frac{2}{5}.\sin\alpha$, което заместваме в $\sin^2\alpha+\cos^2\alpha=1$ и получаваме $\sin^2\alpha+\left(\frac{2}{5}.\sin\alpha\right)^2=1$;

$$\sin^2\alpha+\frac{4}{25}.\sin^2\alpha=1;\ 25\sin^2\alpha+4\sin^2\alpha=25;\ 29\sin^2\alpha=25;\ \sin^2\alpha=\frac{25}{29};$$

$$\sin\alpha=\frac{5}{\sqrt{29}};\ \cos\alpha=\frac{2}{5}.\sin\alpha=\frac{2}{5}.\frac{5}{\sqrt{29}}=\frac{2}{\sqrt{29}};\ \operatorname{tg}\alpha=\frac{1}{\operatorname{cotg}\alpha}=\frac{5}{2}.$$

Стр.71, Зад.19.

$$\cos\alpha=-\frac{1}{4};\ \sin\alpha=\sqrt{1-\cos^2\alpha}=\sqrt{1-\left(-\frac{1}{4}\right)^2}=\sqrt{1-\frac{1}{16}}=\sqrt{\frac{15}{16}}=\frac{\sqrt{15}}{4};$$

$$\operatorname{tg}\alpha=\frac{\sin\alpha}{\cos\alpha}=\frac{\frac{\sqrt{15}}{4}}{-\frac{1}{4}}=-\sqrt{15};\ \operatorname{cotg}\alpha=\frac{1}{\operatorname{tg}\alpha}=-\frac{1}{\sqrt{15}}=-\frac{\sqrt{15}}{15}.$$

Стр.71, Зад.20. $\operatorname{tg}\alpha=\frac{\sin\alpha}{\cos\alpha}=-2$, тогава $\cos\alpha=-\frac{\sin\alpha}{2}$, което заместваме в $\sin^2\alpha+\cos^2\alpha=1$ и получаваме $\sin^2\alpha+\left(-\frac{\sin\alpha}{2}\right)^2=1$;

$$\sin^2\alpha+\frac{\sin^2\alpha}{4}=1;\quad 4\sin^2\alpha+\sin^2\alpha=4;\quad 5\sin^2\alpha=4;\quad \sin^2\alpha=\frac{4}{5};$$

$$\sin\alpha=\sqrt{\frac{4}{5}}=\frac{2}{\sqrt{5}};\ \cos\alpha=-\frac{\sin\alpha}{2}=-\frac{2}{\sqrt{5}}.\frac{1}{2}=-\frac{1}{\sqrt{5}};\ \operatorname{cotg}\alpha=\frac{1}{\operatorname{tg}\alpha}=-\frac{1}{2}.$$

Стр.71, Зад.21. $\operatorname{cotg}\alpha=\frac{\cos\alpha}{\sin\alpha}=-3$, тогава $\cos\alpha=-3.\sin\alpha$, което заместваме в $\sin^2\alpha+\cos^2\alpha=1$ и получаваме $\sin^2\alpha+\left(-3.\sin\alpha\right)^2=1$;

$$\sin^2\alpha+9.\sin^2\alpha=1;\quad 10\sin^2\alpha=1;\quad \sin^2\alpha=\frac{1}{10};\quad \sin\alpha=\frac{1}{\sqrt{10}};$$

$$\cos\alpha=-3.\sin\alpha=-3.\frac{1}{\sqrt{10}}=-\frac{3}{\sqrt{10}};\ \operatorname{tg}\alpha=\frac{1}{\operatorname{cotg}\alpha}=-\frac{1}{3}.$$

Стр.71, Зад.22.

$$\cos\alpha=-\frac{1}{3};\ \sin\alpha=\sqrt{1-\cos^2\alpha}=\sqrt{1-\left(-\frac{1}{3}\right)^2}=\sqrt{1-\frac{1}{9}}=\sqrt{\frac{8}{9}}=\frac{2\sqrt{2}}{3};$$

$$\operatorname{tg}\alpha=\frac{\sin\alpha}{\cos\alpha}=\frac{\frac{2\sqrt{2}}{3}}{-\frac{1}{3}}=-2\sqrt{2}\ ;\ \operatorname{cotg}\alpha=\frac{1}{\operatorname{tg}\alpha}=-\frac{1}{2\sqrt{2}}.\frac{\sqrt{2}}{\sqrt{2}}=-\frac{\sqrt{2}}{2.2}=-\frac{\sqrt{2}}{4}.$$

Стр.71, Зад.23. $\operatorname{tg}\alpha=\frac{\sin\alpha}{\cos\alpha}=-\frac{2}{3}$, тогава $\cos\alpha=-\frac{3}{2}.\sin\alpha$, което заместваме в $\sin^2\alpha+\cos^2\alpha=1$ и получаваме $\sin^2\alpha+\left(-\frac{3}{2}.\sin\alpha\right)^2=1$;

$$\sin^2\alpha+\frac{9}{4}.\sin^2\alpha=1\ ;\ 4\sin^2\alpha+9\sin^2\alpha=4\ ;\ 13\sin^2\alpha=4\ ;\ \sin^2\alpha=\frac{4}{13};$$

$$\sin\alpha=\sqrt{\frac{4}{13}}=\frac{2}{\sqrt{13}};\ \cos\alpha=-\frac{3}{2}.\sin\alpha=-\frac{3}{2}.\frac{2}{\sqrt{13}}=-\frac{3}{\sqrt{13}};\ \operatorname{cotg}\alpha=\frac{1}{\operatorname{tg}\alpha}=-\frac{3}{2}.$$

Стр.74, Зад.1. $\alpha=60^0$;

$$A=\cos\left(180^0-\alpha\right).\operatorname{cotg}\left(90^0-\alpha\right)=\left(-\cos\alpha\right)\operatorname{tg}\alpha=-\cos\alpha.\operatorname{tg}\alpha=$$

$$=-\cos 60^0.\operatorname{tg}60^0=-\frac{1}{2}.\sqrt{3}=-\frac{\sqrt{3}}{2}.$$

Стр.74, Зад.2. $\cos\alpha=\frac{1}{2}$;

$$\sin\alpha=\sqrt{1-\cos^2\alpha}=\sqrt{1-\left(\frac{1}{2}\right)^2}=\sqrt{1-\frac{1}{4}}=\sqrt{\frac{3}{4}}=\frac{\sqrt{3}}{2};$$

$$\operatorname{cotg}\alpha=\frac{\cos\alpha}{\sin\alpha}=\frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}}=\frac{1}{\sqrt{3}};$$

$$A=\sin\left(180^0-\alpha\right).\operatorname{tg}\left(90^0-\alpha\right)=\sin\alpha.\operatorname{cotg}\alpha=\frac{\sqrt{3}}{2}.\frac{1}{\sqrt{3}}=\frac{1}{2}.$$

Стр.74, Зад.3. $\sin\alpha=\frac{1}{3}$;

$$\cos\alpha=\sqrt{1-\sin^2\alpha}=\sqrt{1-\frac{1}{9}}=\sqrt{\frac{8}{9}}=\frac{2\sqrt{2}}{3};\ \operatorname{tg}\alpha=\frac{\sin\alpha}{\cos\alpha}=\frac{\frac{1}{3}}{\frac{2\sqrt{2}}{3}}=\frac{1}{2\sqrt{2}};$$

$$A=\cos\left(180^0-\alpha\right).\operatorname{cotg}\left(90^0+\alpha\right)=\left(-\cos\alpha\right)\left(-\operatorname{tg}\alpha\right)=\cos\alpha.\operatorname{tg}\alpha=$$

$$=\cos\alpha.\frac{\sin\alpha}{\cos\alpha}=\sin\alpha=\frac{1}{3}.$$

Стр.74, Зад.4. $\alpha=45^0$;

$$A=\sin\left(90^0-\alpha\right)+\sin\left(90^0+\alpha\right)-\cos\left(180^0-\alpha\right)=\cos\alpha+\cos\alpha-\left(-\cos\alpha\right)=$$

$$=\cos\alpha+\cos\alpha+\cos\alpha=3\cos\alpha=3\cos 45^0=3.\frac{\sqrt{2}}{2}=\frac{3\sqrt{2}}{2}.$$

Стр.74, Зад.5.

$$\sin\alpha=\frac{2}{\sqrt{5}};\ \cos\alpha=\sqrt{1-\sin^2\alpha}=\sqrt{1-\left(\frac{2}{\sqrt{5}}\right)^2}=\sqrt{1-\frac{4}{5}}=\sqrt{\frac{1}{5}}=\frac{1}{\sqrt{5}};$$

$$A=\sin\left(90^0+\alpha\right).\cos\left(180^0-\alpha\right).\cos\left(90^0+\alpha\right).\sin\left(180^0-\alpha\right)=$$

$$=\cos\alpha\left(-\cos\alpha\right)\left(-\sin\alpha\right).\sin\alpha=\cos^2\alpha.\sin^2\alpha=\left(\frac{2}{\sqrt{5}}\right)^2.\left(\frac{1}{\sqrt{5}}\right)^2=\frac{4}{5}.\frac{1}{5}=\frac{4}{25}.$$

Стр.74, Зад.6. $\alpha = 45^0$;

$A = \sin(90^0 - \alpha) + \sin(90^0 + \alpha) + 2\cos(180^0 - \alpha) - \operatorname{tg}(180^0 - \alpha) =$

$= \cos\alpha + \cos\alpha + 2.(-\cos\alpha) - (-\operatorname{tg}\alpha) = 2\cos\alpha - 2\cos\alpha + \operatorname{tg}\alpha = \operatorname{tg}\alpha = \operatorname{tg}45^0 = 1.$

Стр.74, Зад.7. $\operatorname{tg}\alpha = \dfrac{\sin\alpha}{\cos\alpha} = 3$, тогава $\sin\alpha = 3\cos\alpha$, което заместваме в $\sin^2\alpha + \cos^2\alpha = 1$ и получаваме $9\cos^2\alpha + \cos^2\alpha = 1$; $10\cos^2\alpha = 1$;

$\cos^2\alpha = \dfrac{1}{10}$; $\cos\alpha = \dfrac{1}{\sqrt{10}}$;

$$A = \frac{\cos^2(90^0 - \alpha) - 1}{\cos(180^0 - \alpha)} = \frac{\sin^2\alpha - 1}{-\cos\alpha} = \frac{1 - \sin^2\alpha}{\cos\alpha} = \frac{\cos^2\alpha}{\cos\alpha} = \cos\alpha = \frac{1}{\sqrt{10}}.$$

Стр.74, Зад.8. $\operatorname{cotg}\alpha = \dfrac{\cos\alpha}{\sin\alpha} = 2$, тогава $\cos\alpha = 2\sin\alpha$, което заместваме в $\cos\alpha = 2\sin\alpha$ и получаваме $\sin^2\alpha + 4\sin^2\alpha = 1$;

$5\sin^2\alpha = 1$; $\sin^2\alpha = \dfrac{1}{5}$; $\sin\alpha = \dfrac{1}{\sqrt{5}}$;

$$A = \frac{\sin(180^0 - \alpha)}{\operatorname{tg}\alpha} . \frac{\operatorname{cotg}(90^0 - \alpha)}{\operatorname{tg}(90^0 + \alpha)} . \operatorname{cotg}(180^0 - \alpha) = \frac{\sin\alpha . \operatorname{tg}\alpha . (-\operatorname{cotg}\alpha)}{\operatorname{tg}\alpha . (-\operatorname{cotg}\alpha)} =$$

$$= \sin\alpha = \frac{1}{\sqrt{5}}.$$

Стр.74, Зад.9. $\operatorname{tg}\alpha = \dfrac{\sin\alpha}{\cos\alpha} = 1$, тогава $\sin\alpha = \cos\alpha$. Следователно

$$A = \frac{2\sin\alpha + 3\cos\alpha}{5\sin\alpha - 4\cos\alpha} = \frac{2\sin\alpha + 3\sin\alpha}{5\sin\alpha - 4\sin\alpha} = \frac{5\sin\alpha}{\sin\alpha} = 5.$$

Стр.74, Зад.10. $\operatorname{tg}\alpha = \dfrac{\sin\alpha}{\cos\alpha} = \dfrac{4}{3}$, тогава $\cos\alpha = \dfrac{3}{4}.\sin\alpha$, което заместваме в $\sin^2\alpha + \cos^2\alpha = 1$ и получаваме $\sin^2\alpha + \dfrac{9}{16}.\sin^2\alpha = 1$;

$16\sin^2\alpha + 9\sin^2\alpha = 16$; $25\sin^2\alpha = 16$; $\sin^2\alpha = \dfrac{16}{25}$; $\sin\alpha = \sqrt{\dfrac{16}{25}} = \dfrac{4}{5}$;

$\cos\alpha = \dfrac{3}{4}.\sin\alpha = \dfrac{3}{4}.\dfrac{4}{5} = \dfrac{3}{5}$; $A = \dfrac{2\sin\alpha + \cos\alpha}{5\sin\alpha - 3\cos\alpha} = \dfrac{2.\frac{4}{5} + \frac{3}{5}}{5.\frac{4}{5} - 3.\frac{3}{5}} = \dfrac{\frac{11}{5}}{\frac{11}{5}} = 1$ или

$$A = \frac{2\sin\alpha + \cos\alpha}{5\sin\alpha - 3\cos\alpha} = \frac{\cos\alpha\left(2.\frac{\sin\alpha}{\cos\alpha} + 1\right)}{\cos\alpha\left(5.\frac{\sin\alpha}{\cos\alpha} - 3\right)} = \frac{2\operatorname{tg}\alpha + 1}{5\operatorname{tg}\alpha - 3} = \frac{2.\frac{4}{3} + 1}{5.\frac{4}{3} - 3} = \frac{\frac{11}{3}}{\frac{11}{3}} = 1.$$

Стр.74, Зад.11. $\operatorname{tg}\alpha = \dfrac{\sin\alpha}{\cos\alpha} = 3$, тогава $\cos\alpha = \dfrac{\sin\alpha}{3}$, което заместваме в $\sin^2\alpha + \cos^2\alpha = 1$ и получаваме $\sin^2\alpha + \dfrac{\sin^2\alpha}{9} = 1$; $9\sin^2\alpha + \sin^2\alpha = 9$;

$10\sin^2\alpha = 9$; $\sin^2\alpha = \dfrac{9}{10}$; $\sin\alpha = \sqrt{\dfrac{9}{10}} = \dfrac{3}{\sqrt{10}}$; $\cos\alpha = \dfrac{\sin\alpha}{3} = \dfrac{3}{3.\sqrt{10}} = \dfrac{1}{\sqrt{10}}$;

$$A = \frac{4\cos\alpha + 5\sin\alpha}{3\sin\alpha - 2\cos\alpha} = \frac{4.\frac{1}{\sqrt{10}} + 5.\frac{3}{\sqrt{10}}}{3.\frac{3}{\sqrt{10}} - 2.\frac{1}{\sqrt{10}}} = \frac{\frac{19}{\sqrt{10}}}{\frac{7}{\sqrt{10}}} = \frac{19}{7}$$ или

$$A = \frac{4\cos\alpha + 5\sin\alpha}{3\sin\alpha - 2\cos\alpha} = \frac{\cos\alpha\left(4 + 5.\frac{\sin\alpha}{\cos\alpha}\right)}{\cos\alpha\left(3.\frac{\sin\alpha}{\cos\alpha} - 2\right)} = \frac{4 + 5\operatorname{tg}\alpha}{3\operatorname{tg}\alpha - 2} = \frac{4 + 5.3}{3.3 - 2} = \frac{19}{7}.$$

Стр.74, Зад.12. $\alpha \in \left(90^0;180^0\right)$; $\sin\alpha = \frac{3}{5}$; $\cos\alpha = -\sqrt{1-\sin^2\alpha} =$

$$= -\sqrt{1-\frac{9}{25}} = -\sqrt{\frac{16}{25}} = -\frac{4}{5};\ \operatorname{tg}\alpha = \frac{\sin\alpha}{\cos\alpha} = \frac{\frac{3}{5}}{-\frac{4}{5}} = -\frac{3}{4};$$

$$A = \frac{2+\operatorname{tg}\alpha}{3-2\operatorname{tg}\alpha} = \frac{2+\left(-\frac{3}{4}\right)}{3-2\left(-\frac{3}{4}\right)} = \frac{2-\frac{3}{4}}{3+\frac{6}{4}} = \frac{\frac{5}{4}}{\frac{18}{4}} = \frac{5}{18}.$$

Стр.74, Зад.13.

$$\alpha \in \left(90^0;180^0\right);\ \sin\alpha = \frac{8}{17};\ \cos\alpha = -\sqrt{1-\sin^2\alpha} = -\sqrt{1-\left(\frac{8}{17}\right)^2} = -\sqrt{1-\frac{64}{289}} =$$

$$= -\sqrt{\frac{289-64}{289}} = -\sqrt{\frac{225}{289}} = -\frac{15}{17};\ \operatorname{cotg}\alpha = \frac{\cos\alpha}{\sin\alpha} = \frac{-\frac{15}{17}}{\frac{8}{17}} = -\frac{15}{8};$$

$$A = \frac{1-\operatorname{cotg}\alpha}{2+\operatorname{cotg}\alpha} = \frac{1-\left(-\frac{15}{8}\right)}{2+\left(-\frac{15}{8}\right)} = \frac{1+\frac{15}{8}}{2+\frac{15}{8}} = \frac{\frac{23}{8}}{\frac{31}{8}} = \frac{23}{31}.$$

Стр.75, Зад.14. $\operatorname{cotg}\alpha = \frac{\cos\alpha}{\sin\alpha} = \frac{1}{2}$, тогава $\cos\alpha = \frac{\sin\alpha}{2}$, заместваме в

$\sin^2\alpha + \cos^2\alpha = 1$ и получаваме $\sin^2\alpha + \frac{\sin^2\alpha}{4} = 1$; $4\sin^2\alpha + \sin^2\alpha = 4$;

$$5\sin^2\alpha = 4;\ \sin^2\alpha = \frac{4}{5};\ \sin\alpha = \sqrt{\frac{4}{5}} = \frac{2}{\sqrt{5}};\ \cos\alpha = \frac{\sin\alpha}{2} = \frac{2}{2.\sqrt{5}} = \frac{1}{\sqrt{5}};$$

$$A = \frac{3\cos\alpha.\sin\alpha}{4\sin^2\alpha - 7\cos^2\alpha} = \frac{3.\frac{1}{\sqrt{5}}.\frac{2}{\sqrt{5}}}{4.\left(\frac{2}{\sqrt{5}}\right)^2 - 7\left(\frac{1}{\sqrt{5}}\right)^2} = \frac{\frac{6}{5}}{4.\frac{4}{5}-7.\frac{1}{5}} = \frac{\frac{6}{5}}{\frac{9}{5}} = \frac{6}{9} = \frac{2}{3}$$ или

$$A = \frac{3\cos\alpha.\sin\alpha}{4\sin^2\alpha - 7\cos^2\alpha} = \frac{3}{\frac{4\sin^2\alpha}{\sin\alpha.\cos\alpha} - \frac{7\cos^2\alpha}{\sin\alpha.\cos\alpha}} = \frac{3}{4\operatorname{tg}\alpha - 7\operatorname{cotg}\alpha} =$$

$$= \frac{3}{\frac{4}{\operatorname{cotg}\alpha} - 7\operatorname{cotg}\alpha} = \frac{3}{4.2-7.\frac{1}{2}} = \frac{3}{\frac{16-7}{2}} = \frac{3}{\frac{9}{2}} = \frac{6}{9} = \frac{2}{3}.$$

Стр.75, Зад.15. $\cos 15^0 = \frac{\sqrt{2+\sqrt{3}}}{2}$

а) $\sin 75^0 = \sin\left(90^0 - 15^0\right) = \cos 15^0 = \frac{\sqrt{2+\sqrt{3}}}{2}$;

$$\cos 75^0 = \sqrt{1-\sin^2 75^0} = \sqrt{1-\left(\frac{\sqrt{2+\sqrt{3}}}{2}\right)^2} = \sqrt{1-\frac{2+\sqrt{3}}{4}} =$$

$$= \sqrt{\frac{4-2-\sqrt{3}}{4}} = \frac{\sqrt{2-\sqrt{3}}}{2};$$

$$\operatorname{tg} 75^0 = \frac{\sin 75^0}{\cos 75^0} = \frac{\frac{\sqrt{2+\sqrt{3}}}{2}}{\frac{\sqrt{2-\sqrt{3}}}{2}} = \frac{\sqrt{2+\sqrt{3}}}{\sqrt{2-\sqrt{3}}}.\frac{\sqrt{2+\sqrt{3}}}{\sqrt{2+\sqrt{3}}} = \frac{2+\sqrt{3}}{\sqrt{4-3}} = 2+\sqrt{3};$$

$$\operatorname{cotg} 75^0 = \frac{1}{\operatorname{tg} 75^0} = \frac{1}{2+\sqrt{3}}.\frac{2-\sqrt{3}}{2-\sqrt{3}} = \frac{2-\sqrt{3}}{4-3} = 2-\sqrt{3};$$

б) $\cos 165^0 = \cos\left(180^0 - 15^0\right) = -\cos 15^0 = -\frac{\sqrt{2+\sqrt{3}}}{2}$; $\sin 165^0 = \sqrt{1-\cos^2 165^0} =$

$$= \sqrt{1-\left(-\frac{\sqrt{2+\sqrt{3}}}{2}\right)^2} = \sqrt{1-\frac{2+\sqrt{3}}{4}} = \sqrt{\frac{4-2-\sqrt{3}}{4}} = \frac{\sqrt{2-\sqrt{3}}}{2};$$

$$\text{tg}165^0 = \frac{\sin 165^0}{\cos 165^0} = \frac{\frac{\sqrt{2-\sqrt{3}}}{2}}{-\frac{\sqrt{2+\sqrt{3}}}{2}} = -\frac{\sqrt{2-\sqrt{3}}}{\sqrt{2+\sqrt{3}}}.\frac{\sqrt{2-\sqrt{3}}}{\sqrt{2-\sqrt{3}}} = -\frac{2-\sqrt{3}}{\sqrt{4-3}} = -2+\sqrt{3};$$

$$\text{cotg}165^0 = \frac{1}{\text{tg}165^0} = \frac{1}{-2+\sqrt{3}} = -\frac{1}{2-\sqrt{3}}.\frac{2+\sqrt{3}}{2+\sqrt{3}} = -\frac{2+\sqrt{3}}{4-3} = -2-\sqrt{3}.$$

Стр.75, Зад.16. $\sin 18^0 = \frac{\sqrt{5}-1}{4}$;

а) $\cos 18^0 = \sqrt{1-\sin^2 18^0} = \sqrt{1-\left(\frac{\sqrt{5}-1}{4}\right)^2} = \sqrt{1-\frac{5-2\sqrt{5}+1}{16}} =$

$$= \sqrt{\frac{16-6+2\sqrt{5}}{16}} = \frac{\sqrt{10+2\sqrt{5}}}{4};$$

б) $\sin 72^0 = \sin\left(90^0 - 18^0\right) = \cos 18^0 = \frac{\sqrt{10+2\sqrt{5}}}{4}$;

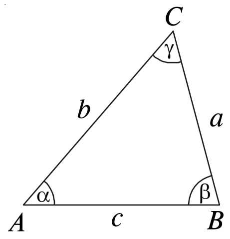
в) $\cos 72^0 = \cos\left(90^0 - 18^0\right) = \sin 18^0 = \frac{\sqrt{5}-1}{4}$;

г) $\sin 108^0 = \sin\left(90^0 + 18^0\right) = \cos 18^0 = \frac{\sqrt{10+2\sqrt{5}}}{4}$;

д) $\cos 108^0 = \cos\left(90^0 + 18^0\right) = -\sin 18^0 = -\frac{\sqrt{5}-1}{4} = \frac{1-\sqrt{5}}{4}$.

Синусова и косинусова теореми

(Кратки теоритични бележки)



I. Синусова теорема - $\frac{a}{\sin\alpha} = \frac{\beta}{\sin\beta} = \frac{c}{\sin\gamma} = 2R$.

Използваме синусова теорема при решаване на триъгълник по дадени две страни и ъгъл срешу една от тях или по два ъгъла и една страна.

II. Косинусова теорема

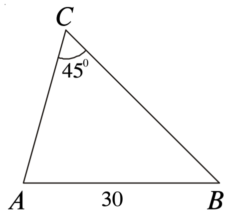
$a^2 = b^2 + c^2 - 2bc.\cos\alpha$, $b^2 = a^2 + c^2 - 2ac.\cos\beta$, $c^2 = a^2 + b^2 - 2ab.\cos\gamma$.

В израза на косинусова теорема участвуват четири величини - три страни и един ъгъл. Трябва да знаем три от тях, за да намерим четвъртата. При решаване на триъгълник чрез косинусова теорема различаваме следните основни задачи:

1) - да се реши триъгълни по дадени две страни и ъгъл между тях;

2) - да се реши триъгълник по дадени три страни;

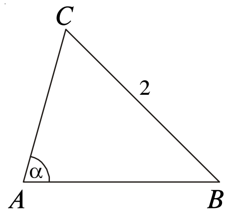
3) - да се реши триъгълник по дадени две страни и ъгъл срешу една от тях.



Стр.77, Зад.1. , $\measuredangle\gamma = 45^0$, $R = ?$.

От синусова теорема за ΔABC , $\frac{AB}{\sin\gamma} = 2R$;

$$R = \frac{AB}{2\sin\gamma} = \frac{30}{2.\sin 45^0} = \frac{15}{\frac{\sqrt{2}}{2}} = \frac{30}{\sqrt{2}}.\frac{\sqrt{2}}{\sqrt{2}} = 15\sqrt{2}.$$



Стр.77, Зад.2. $R = \frac{2\sqrt{3}}{3}$, $BC = 2$, $\alpha = ?$.

От синусова теорема за ΔABC следва, че

$\frac{BC}{\sin\alpha} = 2R$; $\sin\alpha = \frac{BC}{2R} = \frac{2}{2.\frac{2\sqrt{3}}{3}} = \frac{3}{2\sqrt{3}} = \frac{\sqrt{3}}{2}$.

Следователно $\alpha = 60^0$.