2.82
ה5

$$\frac{\cos\gamma + 2\cos\alpha}{\cos\gamma + 2\cos\beta} = \frac{\sin\beta}{\sin\alpha} \qquad \gamma = 180-\alpha-\beta$$

$$\frac{\cos(180-\alpha-\beta)+2\cos\alpha}{\cos(180-\alpha-\beta)+2\cos\beta} = \frac{\sin\beta}{\sin\alpha}$$

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

$$-\sin\alpha\cos(\alpha+\beta)+2\cos\alpha\sin\alpha = -\sin\beta\cos(\alpha+\beta)+2\cos\beta\sin\beta$$

$$-\frac{1}{2}\sin(2\alpha+\beta)-\frac{1}{2}\sin(-\beta)+\sin2\alpha = -\frac{1}{2}\sin(2\beta+\alpha)-\frac{1}{2}\sin(-\alpha)+\sin2\beta$$

$$-\frac{1}{2}\left(\sin(2\alpha+\beta)-\sin(2\beta+\alpha)\right)+\frac{1}{2}\sin\beta-\frac{1}{2}\sin\alpha+\sin2\alpha-\sin2\beta=0$$

$$-\sin\left(\frac{\alpha-\beta}{2}\right)\cos\left(\frac{3\alpha+3\beta}{2}\right)+\sin\left(\frac{\beta-\alpha}{2}\right)\cos\left(\frac{\beta+\alpha}{2}\right)+2\sin(\alpha-\beta)\cos(\alpha+\beta)$$

$$-\sin\left(\frac{\alpha-\beta}{2}\right)\cos\left(\frac{3\alpha+3\beta}{2}\right)-\sin\left(\frac{\alpha-\beta}{2}\right)\cos\left(\frac{\beta+\alpha}{2}\right)+4\sin\left(\frac{\alpha-\beta}{2}\right)\cos\left(\frac{\alpha-\beta}{2}\right)\cos(\alpha+\beta)=$$

$$-\sin\left(\frac{\alpha-\beta}{2}\right)\left[\cos\left(\frac{3\alpha+3\beta}{2}\right)+\cos\left(\frac{\alpha+\beta}{2}\right)-4\cos\left(\frac{\alpha-\beta}{2}\right)\cos(\alpha+\beta)\right]=0$$

↙

$\frac{\alpha-\beta}{2}=0$

משולש $\boxed{\alpha=\beta}$

↓

$$2\cos(\alpha+\beta)\cos\left(\frac{\alpha}{2}-\frac{\beta}{2}\right)-4\cos(\alpha+\beta)\cos\left(\frac{\alpha-\beta}{2}\right)=0$$

$$2\cos(\alpha+\beta)\left[\cos\left(\frac{\alpha}{2}-\frac{\beta}{2}\right)-2\cos\left(\frac{\alpha}{2}-\frac{\beta}{2}\right)\right]=0$$

↙

משולש ישר זווית $\alpha+\beta=90°$

$$-\cos\left(\frac{\alpha}{2}-\frac{\beta}{2}\right)=0$$

$$\frac{\alpha}{2}-\frac{\beta}{2}=\pm90$$

$$\alpha-\beta=\pm180$$

לא מתאים למשולש