

$$\begin{aligned}
 1. \quad & \sqrt{3} \operatorname{sen} \frac{\pi}{3} - \sqrt{3} \operatorname{tg} \frac{\pi}{3} - \operatorname{sen} \frac{\pi}{6} + \frac{\operatorname{sen} \frac{\pi}{3}}{\cos \frac{\pi}{6}} + \frac{1}{\cos \pi} - 8 \cos \frac{\pi}{3} \\
 & = \sqrt{3} \cdot \frac{\sqrt{3}}{2} - \sqrt{3} \cdot \sqrt{3} - \frac{1}{2} + \frac{\frac{\sqrt{3}}{2}}{\frac{\sqrt{3}}{2}} - 1 - 8 \cdot \frac{1}{2} = \frac{3}{2} - 3 - \frac{1}{2} + 1 - 1 - 4 = -6
 \end{aligned}$$

$$\begin{aligned}
 2. \quad & 4 \operatorname{sen} \frac{5}{6} \pi \cdot \cos \frac{7}{6} \pi - 2 \cos \frac{5}{6} \pi + 3 \operatorname{tg} \frac{3}{4} \pi + \operatorname{sen} \frac{7}{2} \pi = \\
 & = 4 \cdot \frac{1}{2} \cdot \left(-\frac{\sqrt{3}}{2} \right) - 2 \cdot \left(-\frac{\sqrt{3}}{2} \right) + 3(-1) + (-1) = -\sqrt{3} + \sqrt{3} - 3 - 1 = -4
 \end{aligned}$$

$$\begin{aligned}
 3. \quad & 2 \operatorname{sen} \frac{7}{4} \pi \cdot \cos \frac{5}{4} \pi - \frac{3}{\sqrt{3}} \operatorname{ctg} \frac{11}{6} \pi + \operatorname{sen} \frac{7}{6} \pi + \frac{\sqrt{2}}{2} \cos \frac{9}{4} \pi = \\
 & = 2 \left(-\frac{\sqrt{2}}{2} \right) \cdot \left(-\frac{\sqrt{2}}{2} \right) - \frac{3}{\sqrt{3}} (-\sqrt{3}) - \frac{1}{2} + \frac{\sqrt{2}}{2} \cdot \frac{\sqrt{2}}{2} = 1 + 3 - \frac{1}{2} + \frac{1}{2} = 4
 \end{aligned}$$

$$\begin{aligned}
 4. \quad & \operatorname{sen} \left(\frac{\pi}{3} + x \right) + \cos \left(\frac{\pi}{6} + x \right) \\
 & = \operatorname{sen} \frac{\pi}{3} \cos x + \cos \frac{\pi}{3} \operatorname{sen} x + \cos \frac{\pi}{6} \cos x - \operatorname{sen} \frac{\pi}{6} \operatorname{sen} x = \\
 & = \frac{\sqrt{3}}{2} \cos x + \frac{1}{2} \operatorname{sen} x + \frac{\sqrt{3}}{2} \cos x - \frac{1}{2} \operatorname{sen} x = \sqrt{3} \cos x
 \end{aligned}$$

$$\begin{aligned}
 5. \quad & \frac{1 - \cos 2\alpha}{1 + \cos 2\alpha} \cdot \operatorname{ctg} \alpha \\
 & = \frac{1 - (1 - 2 \operatorname{sen}^2 \alpha)}{1 + 2 \cos^2 \alpha - 1} \cdot \frac{\cos \alpha}{\operatorname{sen} \alpha} = \frac{1 - 1 + 2 \operatorname{sen}^2 \alpha}{2 \cos^2 \alpha} \cdot \frac{\cos \alpha}{\operatorname{sen} \alpha} = \frac{2 \operatorname{sen}^2 \alpha}{2 \cos^2 \alpha} \cdot \frac{\cos \alpha}{\operatorname{sen} \alpha} = \operatorname{tg} \alpha
 \end{aligned}$$

$$6. \quad \text{sen}(-\alpha) + \text{sen}\left(\frac{\pi}{2} - \alpha\right) + \cos(\pi + \alpha) - \cos(\pi - \alpha) =$$

$$= -\text{sen } \alpha + \cos \alpha - \cos \alpha + \cos \alpha = \text{cos } \alpha - \text{sen } \alpha$$

$$7. \quad \frac{\text{sen}(450^\circ + \alpha) \cos(\alpha - 270^\circ) \cos(720^\circ - \alpha)}{\text{tg}(\alpha + 180^\circ) \cos(540^\circ - \alpha)} + \text{sen}^2(180^\circ - \alpha) =$$

$$= \frac{\cos \alpha (-\text{sen } \alpha) \cos \alpha}{\text{tg } \alpha (-\cos \alpha)} + \text{sen}^2 \alpha = \frac{\cos \alpha \text{sen } \alpha}{\text{tg } \alpha} + \text{sen}^2 \alpha =$$

$$= \cos \alpha \text{sen } \alpha \cdot \frac{\cos \alpha}{\text{sen } \alpha} + \text{sen}^2 \alpha = \cos^2 \alpha + \text{sen}^2 \alpha = 1$$

$$8. \quad \text{tg} \frac{\alpha}{2} - 2 \frac{\text{sen}^2 \frac{\alpha}{2}}{\text{sen } \alpha}$$

$$= \frac{1 - \cos \alpha}{\text{sen } \alpha} - 2 \left(\frac{1 - \cos \alpha}{2} \right) \cdot \frac{1}{\text{sen } \alpha} = \frac{1 - \cos \alpha - 1 + \cos \alpha}{\text{sen } \alpha} = 0$$

$$9. \quad \text{sen } \alpha \cos 2\alpha - \cos \alpha \text{sen } 2\alpha = \cos\left(\frac{\pi}{2} + \alpha\right)$$

$$\text{sen } \alpha (2\cos^2 \alpha - 1) - \cos \alpha (2\text{sen } \alpha \cos \alpha) = -\text{sen } \alpha$$

$$2\cos^2 \alpha \text{sen } \alpha - \text{sen } \alpha - 2\cos^2 \alpha \text{sen } \alpha = -\text{sen } \alpha \quad \text{---sen } \alpha = \text{---sen } \alpha$$

$$10. \quad \text{sen } 2\alpha \text{tg } \alpha + \cos^2 \alpha = 2 - \cos 2\alpha - \text{sen}^2 \alpha$$

$$2 \text{sen } \alpha \cos \alpha \frac{\text{sen } \alpha}{\cos \alpha} + \cos^2 \alpha = 2 - (\cos^2 \alpha - \text{sen}^2 \alpha) - \text{sen}^2 \alpha$$

$$2 \text{sen}^2 \alpha + \cos^2 \alpha = 2 - \cos^2 \alpha + \text{sen}^2 \alpha - \text{sen}^2 \alpha$$

$$2(1 - \cos^2 \alpha) + \cos^2 \alpha = 2 - \cos^2 \alpha$$

$$2 - 2\cos^2 \alpha + \cos^2 \alpha = 2 - \cos^2 \alpha \quad 2 - \cos^2 \alpha = 2 - \cos^2 \alpha$$