1. **Teoría:** Reducción al primer cuadrante

(a) Ángulos complementarios (suman 90º)

$$\begin{aligned} sen\ (90^o - \alpha) &= \cos\alpha \\ \cos\ (90^o - \alpha) &= \text{sen}\ \alpha \\ tg\ (90^o - \alpha) &= \text{cotg}\ \alpha \end{aligned}$$

(c) Ángulos suplementarios (suman 180º)

$$\begin{aligned} sen\ (180^o - \alpha) &= \text{sen}\ \alpha \\ \cos\ (180^o - \alpha) &= \text{-}\cos\alpha \\ tg\ (180^o - \alpha) &= \text{-tg}\ \alpha \end{aligned}$$

(e) Ángulos cuya suma es 360º

$$\begin{aligned} sen\ (360^o - \alpha) &= \text{-sen}\ \alpha \\ \cos\ (360^o - \alpha) &= \cos\alpha \\ tg\ (360^o - \alpha) &= \text{-tg}\ \alpha \end{aligned}$$

(b) Ángulos que difieren 90º

$$\begin{aligned} sen\ (90^o + \alpha) &= \cos\alpha \\ \cos\ (90^o + \alpha) &= \text{-sen}\ \alpha \\ tg\ (90^o + \alpha) &= \text{-cotg}\ \alpha \end{aligned}$$

(d) Ángulos que difieren 90º

$$\begin{aligned} sen\ (180^o + \alpha) &= \text{-sen}\ \alpha \\ \cos\ (180^o + \alpha) &= \text{-}\cos\alpha \\ tg\ (180^o + \alpha) &= \text{tg}\ \alpha \end{aligned}$$

2. Demostrar que para cualquier ángulo α, se verifica: $\sec^2\alpha + \text{cosec}^2\alpha = \sec^2\alpha \cdot \text{cosec}^2\alpha$

3. Demostrar si son verdaderas o falsas las siguientes ecuaciones:

(a) $\dfrac{\text{tg}\ \alpha\ +\ \text{tg}\ \beta}{\text{cotg}\ \alpha\ +\ \text{cotg}\ \beta} = \text{tg}\ \alpha\ .\ \text{tg}\ \beta$

(b) $\dfrac{\text{sen}\ \alpha\ .\ \cos\alpha}{\cos^2\alpha\ \text{-}\ \text{sen}^2\alpha} = \dfrac{\text{tg}\ \alpha}{1\ \text{-}\ \text{tg}^2\alpha}$

(c) $\text{cotg}\ \alpha\ \text{-}\ \dfrac{\text{cotg}^2\alpha\ \text{-}\ 1}{\text{cotg}\ \alpha} = \text{tg}\ \alpha$

(d) $\dfrac{\text{sen}\ \alpha\ +\ \text{cotg}\ \alpha}{\text{tg}\ \alpha\ +\ \text{cosec}\ \alpha} = \cos\alpha$

(e) $\text{cotg}^2\alpha\ \text{-}\ \cos^2\alpha = \text{cotg}^2\alpha\ .\ \cos^2\alpha$

(f) $\text{sen}\,\alpha\ .\ \cos\alpha\ .\ \text{tg}\ \alpha\ .\ \text{cotg}\alpha\ .\ \sec\alpha\ .\ \text{cosec}\ \alpha = 1$

(g) $\dfrac{1+\text{tg}\,\alpha}{1-\text{tg}\,\alpha} = \dfrac{\cos\alpha+\text{sen}\,\alpha}{\cos\alpha-\text{sen}\,\alpha}$

(h) $\dfrac{1\ +\ \text{tg}^2\alpha}{\cot g\ \alpha} = \dfrac{\text{tg}\ \alpha}{\cos^2\alpha}$

4. Simplificar las siguientes expresiones:

(a) $sen\ \alpha\ .\ \frac{1}{\text{tg}\ \alpha}$

(b) $sen^3\alpha +\ \text{sen}\ \alpha\ .\ \cos^2\alpha$

(c) $\sqrt{1\ \text{-}\ \text{sen}\ \alpha}\ .\ \sqrt{1\ +\ \text{sen}\ \alpha}$

(d) $sen^4\alpha\ \text{-}\ \cos^4\alpha$

(e) $\cos^3\alpha + \cos^2\alpha\ .\ \text{sen}\ \alpha + \cos\alpha\ .\ \text{sen}^2\alpha + \text{sen}^3\alpha$

(f) $sen\ \alpha\ .\ \cos\alpha\left(\text{tg}\ \alpha\ +\ \dfrac{1}{\text{tg}\ \alpha}\right)$

(g) $\dfrac{\cos^2\alpha\ \text{-}\ \text{sen}^2\alpha}{\cos^4\alpha\ \text{-}\ \text{sen}^4\alpha}$

(h) $\dfrac{\sec^2\alpha\ +\ \cos^2\alpha}{\sec^2\alpha\ \text{-}\ \cos^2\alpha}$

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

(j) $\dfrac{\cos ec\ \alpha}{1\ +\ \cot g^2\alpha}$

5. Calcular las restantes razones trigonométricas de α, conocida:

(a) $\cos\ \alpha = \frac{4}{5}$ y $\alpha \in$ I

(b) $sen\ \alpha = \frac{3}{5}$ y $\alpha \in$ II

(c) $tg\ \alpha = \text{-}\ \frac{3}{4}$ y $\alpha \in$ II

(d) $\sec\ \alpha = 2$ y $\alpha \in$ IV

(e) $\cos ec\ \alpha = \text{-}\ 2$ y $\alpha \in$ III

(f) $\cot g\ \alpha = \text{-}\ 2$ y $\alpha \in$ IV

6. Si $\text{tg}\,\alpha = \dfrac{3}{4}$, halla el valor de las siguientes razones trigonométricas:

(a) $\operatorname{tg}\left(\frac{\pi}{2} - \alpha\right) =$

(b) $\operatorname{sen}(\pi - \alpha) =$

(c) $\cos(\pi + \alpha) =$

(d) $\operatorname{tg}(\pi - \alpha) =$

(e) $\operatorname{cotg}\left(\frac{\pi}{2} + \alpha\right) =$

(f) $\sec(\pi - \alpha) =$

(g) $\operatorname{cosec}\left(\frac{3\pi}{2} - \alpha\right)$

(h) $\cos\left(\frac{3\pi}{2} + \alpha\right) =$

(i) $\operatorname{sen}(\pi + \alpha) =$

(j) $\operatorname{tg}\left(\frac{\pi}{2} + \alpha\right)$

(k) $\operatorname{cotg}(\pi + \alpha) =$

(l) $\sec(\pi - \alpha) =$

7. Resolver las siguientes ecuaciones:

   (a) $\operatorname{sen} 2x = \frac{1}{2}$

   (b) $\operatorname{tg} \frac{x}{2} = \frac{\sqrt{3}}{3}$

   (c) $\operatorname{sen}\left(3x - \frac{\pi}{2}\right) = -\frac{1}{2}$

8. Resolver las siguientes ecuaciones:

   (a) $2 \operatorname{sen} x + \operatorname{cosec} x = 2\sqrt{2}$

   (b) $\operatorname{sen} x = \cos^2 x + 1$

   (c) $\operatorname{tg} x - \operatorname{sen} x = 0$

   (d) $\operatorname{sen} x \,.\, \cos x = 2.\operatorname{sen} x$

   (e) $2 \cos x - 3\operatorname{tg} x = 0$

   (f) $\operatorname{tg} x + 3.\operatorname{cotg} x = 4$