Ejercicios de Trigonometría

1 Expresa en grados sexagesimales los siguientes ángulos:

1 3 rad

2 2π/5rad.

3 3π/10 rad.

2 Expresa en radianes los siguientes ángulos:

1 316°

2 10°

3 127º

3 Sabiendo que cos α = ¼ , y que 270º <α <360°. Calcular las restantes razones trigonométricas del ángulo α.

4 Sabiendo que tg α = 2, y que 180º < α <270°. Calcular las restantes razones trigonométricas del ángulo α.

5 Sabiendo que sec α = 2, 0< α < π/2, calcular las restantes razones trigonométricas.

6 Calcula las razones de los siguientes ángulos:

1 225°

2 330°

3 2655°

4 −840º

7 Comprobar las identidades:

1 $\text{tg} \propto + \text{cotg} \propto = \sec \propto \cdot \text{cosec} \propto$

2 $cotg^2 \propto = cos^2 \propto + (cotg \propto \cdot \cos \propto)^2$

3 $\frac{1}{sec^2 \propto} = sen^2 \propto \cdot cos^2 \propto + cos^4 \propto$

4 $\text{cotg} \propto \cdot \sec \propto = \text{cosec} \propto$

5 $sec^2 \propto + cosec^2 \propto = \frac{1}{sen^2 \propto \cdot cos^2 \propto}$

Soluciones Ejercicios de Trigonometría

1 Expresa en grados sexagesimales los siguientes ángulos:

1 3 rad

$$\frac{\pi}{3}=\frac{180^{o}}{\alpha} \qquad \alpha=\frac{180^{o}\cdot 3}{\pi}=171.887^{o}=171^{o}\,53'14''$$

$$0.887^{o}\cdot 60=53.24' \qquad 0.24'\cdot 60=14''$$

2 2π/5rad.

$$\frac{2\pi}{5}rad=\frac{2\cdot 180^{o}}{5}=72^{o}$$

3 3π/10 rad.

$$\frac{3\pi}{10}rad=\frac{3\cdot 180^{o}}{10}=54^{o}$$

2 Expresa en radianes los siguientes ángulos:

1 316°

$$\frac{\pi}{\alpha}=\frac{180^{o}}{316^{o}} \qquad \alpha=\frac{316\pi}{180}=\frac{79\pi}{45}rad$$

2 10°

$$\frac{\pi}{\alpha}=\frac{180^{o}}{10^{o}} \qquad \alpha=\frac{10\pi}{180}=\frac{\pi}{18}rad$$

3 127º

$$\frac{\pi}{\alpha}=\frac{180^{o}}{127^{o}} \qquad \alpha=\frac{127\pi}{180}=2.216\ rad$$

3 Sabiendo que cos α = ¼ , y que 270º <α <360°. Calcular las restantes razones trigonométricas del ángulo α.

$$\text{sen}\ \alpha=-\sqrt{1-\left(\frac{1}{4}\right)^{2}}=-\frac{\sqrt{15}}{4} \qquad \text{cosec}\ \alpha=-\frac{4\sqrt{15}}{15}$$

$$\cos\ \alpha=\frac{1}{4} \qquad \sec\ \alpha=4$$

$$\text{tg } \alpha = -\frac{\frac{\sqrt{15}}{4}}{\frac{1}{4}} = -\sqrt{15} \qquad \text{cotg } \alpha = -\frac{\sqrt{15}}{15}$$

4 Sabiendo que tg α = 2, y que 180º < α <270°. Calcular las restantes razones trigonométricas del ángulo α.

$$\sec \alpha = -\sqrt{1+4} = -\sqrt{5} \qquad \cos \alpha = -\frac{1}{\sqrt{5}} = -\frac{\sqrt{5}}{5}$$

$$\text{sen } \alpha = 2 \cdot \left(-\frac{\sqrt{5}}{5}\right) = -\frac{2\sqrt{5}}{5} \qquad \text{cosec } \alpha = -\frac{\sqrt{5}}{2}$$

$$\text{tg } \alpha = 2 \qquad \text{cotg } \alpha = \frac{1}{2}$$

5 Sabiendo que sec α = 2, 0< α < π/2, calcular las restantes razones trigonométricas.

$$\cos \alpha = \frac{1}{2} \qquad \sec \alpha = 2$$

$$\text{sen } \alpha = \sqrt{1-\left(\frac{1}{2}\right)^2} = \frac{\sqrt{3}}{2} \qquad \text{cosec } \alpha = \frac{2\sqrt{3}}{3}$$

$$\text{tg } \alpha = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \sqrt{3} \qquad \text{cotg } \alpha = \frac{\sqrt{3}}{3}$$

6 Calcula las razones de los siguientes ángulos:

1 225°

$$sen\,(225°) = sen\,(180° + 45°) = -sen\,45° = -\frac{\sqrt{2}}{2}$$

$$\cos(225°) = \cos(180° + 45°) = -\cos 45° = -\frac{\sqrt{2}}{2}$$

$$tg\,(225°) = tg\,(180° + 45°) = tg\,45° = 1$$

2 330°

$$sen\,(330°) = sen\,(360° - 30°) = -sen\,30° = -\frac{1}{2}$$

$$\cos(330^\circ) = \cos(360^\circ - 30^\circ) = \cos 30^\circ = \frac{\sqrt{3}}{2}$$

$$tg(330^\circ) = tg(360^\circ - 30^\circ) = -tg\,30^\circ = -\frac{\sqrt{3}}{3}$$

3 2655°

$$\begin{array}{ll} 2655^\circ & \underline{|\,360^\circ} \\ 135^\circ & 7 \end{array}$$

$$sen\,2655^\circ = sen\,135^\circ = sen(180^\circ - 45^\circ) = sen\,45^\circ = \frac{\sqrt{2}}{2}$$

$$\cos 2655^\circ = \cos 135^\circ = \cos(180^\circ - 45^\circ) = -\cos 45^\circ = -\frac{\sqrt{2}}{2}$$

$$tg\,2655^\circ = -1$$

4 −840º

$$\begin{array}{ll} -840^\circ & \underline{|\,360^\circ} \\ -120^\circ & -2 \end{array}$$

$$sen(-840^\circ) = sen(-120^\circ) = -sen(180^\circ - 60^\circ) = -sen\,60^\circ = -\frac{\sqrt{3}}{2}$$

$$\cos(-840^\circ) = \cos(-120^\circ) = \cos(180^\circ - 60^\circ) = -\cos 60^\circ = -\frac{1}{2}$$

$$tg(-840^\circ) = tg(-120^\circ) = -tg(120^\circ) = \sqrt{3}$$

7 Comprobar las identidades:

1 $\text{tg} \propto + \text{cotg} \propto = \sec \propto \cdot \text{cosec} \propto$

$$tg\,\alpha + \text{cotg}\,\alpha = \frac{sen\,\alpha}{\cos\alpha} + \frac{\cos\alpha}{sen\,\alpha} = \frac{sen^2\alpha + \cos^2\alpha}{\cos\alpha \cdot sen\,\alpha} =$$

$$= \frac{1}{\cos\alpha \cdot sen\,\alpha} = \sec\alpha \cdot \text{cosec}\,\alpha$$

2 $cotg^2 \propto = cos^2 \propto + (cotg \propto \cdot \cos \propto)^2$

$$\cos^2 a + (\text{cotg } a \cdot \cos a)^2 = \cos^2 a + \text{cotg}^2 a \cdot \cos^2 a =$$

$$\cos^2 a(1 + \text{cotg}^2 a) = \cos^2 a \cdot \text{cosec}^2 a = \frac{\cos^2 a}{\text{sen}^2 a} = \text{cotg}^2 a$$

3 $\frac{1}{sec^2 \propto} = sen^2 \propto \cdot cos^2 \propto + cos^4 \propto$

$$\text{sen}^2 a \cdot \cos^2 a + \cos^4 a = \cos^2 a(\text{sen}^2 a + \cos^2 a) = \cos^2 a = \frac{1}{\sec^2 a}$$

4 $\text{cotg} \propto \cdot \sec \propto = \text{cosec} \propto$

$$\text{cotg} a \cdot \sec a = \frac{\cos a}{\text{sen} a} \cdot \frac{1}{\cos a} = \frac{1}{\text{sen} a} = \text{cosec} a$$

5 $sec^2 \propto + cosec^2 \propto = \frac{1}{sen^2 \propto \cdot cos^2 \propto}$

$$\sec^2 a + \text{cosec}^2 a = \frac{1}{\cos^2 a} + \frac{1}{\text{sen}^2 a} = \frac{\text{sen}^2 a + \cos^2 a}{\text{sen}^2 a \cdot \cos^2 a} = \frac{1}{\text{sen}^2 a \cdot \cos^2 a}$$