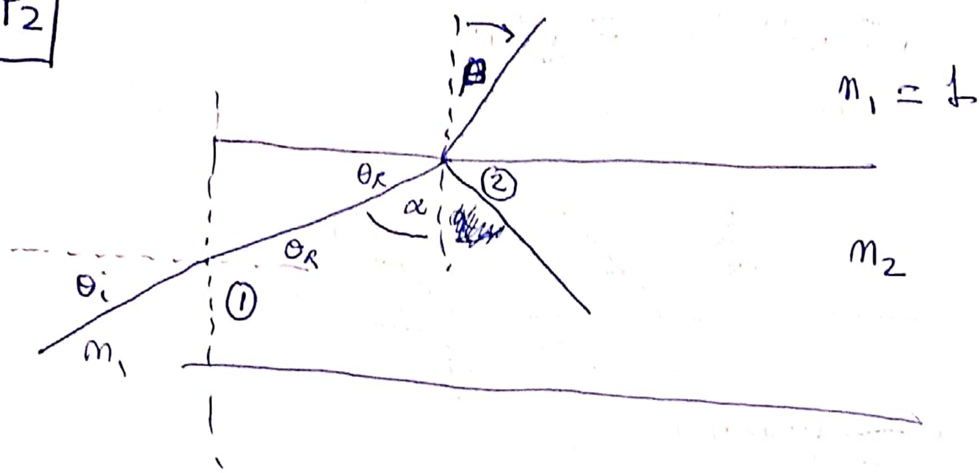
P2



incognita : n_2

$$\alpha = \frac{\pi}{2} - \theta_R$$

1 $\sin\theta_i \, n_1 = \sin\theta_R \, n_2$

2 $\sin\alpha \, n_2 = \sin\beta \, n_1$

~~Reflexión~~ $\beta \geq \pi/2$

$\Rightarrow$ 2 $\sin\alpha \, n_2 = 1$ 3

De 1 despejamos θ_R

$$\sin\theta_R = \frac{\sin\theta_i}{n_2} \Rightarrow \theta_R = \arcsin\left(\frac{\sin\theta_i}{n_2}\right) \quad (4)$$

4 $\longrightarrow$ 3

$$\sin\alpha \, n_2 = 1 \Leftrightarrow n_2 \sin\left(\frac{\pi}{2} - \theta_R\right) = 1$$

$$\Leftrightarrow n_2 \cos(\theta_R) = 1$$

$$n_2 \cos\left(\arcsin\left(\frac{\sin\theta_i}{n_2}\right)\right) = 1 \quad (5)$$

ahora ejo

$$\underbrace{\cos\left(\arcsin\left(\frac{\sin\theta_i}{n_2}\right)\right)}_{x}$$ cambio de Variable

$$\cos^2(x) + \sin^2(x) = 1$$

$$\Rightarrow \cos(x) = \sqrt{1 - \sin^2(x)}$$

Recuperamos la Variable:

$$\cos\left(\arcsin\left(\frac{\sin\theta_i}{n_2}\right)\right) = \sqrt{1 - \sin^2\left(\arcsin\left(\frac{\sin\theta_i}{n_2}\right)\right)}$$

$$= \sqrt{1 - \frac{\sin^2\theta_i}{n_2^2}}$$

$$\Rightarrow (5) \quad n_2 \cdot \sqrt{1 - \frac{\sin^2\theta_i}{n_2^2}} = 1 \quad // (\ )^2$$

$$n_2^2 \left(1 - \frac{\sin^2\theta_i}{n_2^2}\right) = 1$$

Escaneado con CamScanner

$$n_2^2 - \sin^2\theta_i - 1 = 0$$

$$\Rightarrow n_2 = \frac{\pm\sqrt{4\sin^2\theta_i + 4}}{2}$$

$$= +\sqrt{\sin^2\theta_i + 1}$$

el $\sin\theta_i$ tomo su valor maximo y es 1.

$$\Rightarrow n_{2\,max} = \sqrt{1+1}$$

$$n_{2\,max} = \sqrt{2} \approx 1,4142.$$

$$\boxed{n_2 \approx 1,4142}$$