$nf := 3.47 \qquad nc := 1.45$

$d := 220 \cdot 10^{-9} \cdot m$

$\lambda := 1550 \cdot 10^{-9} \cdot m$

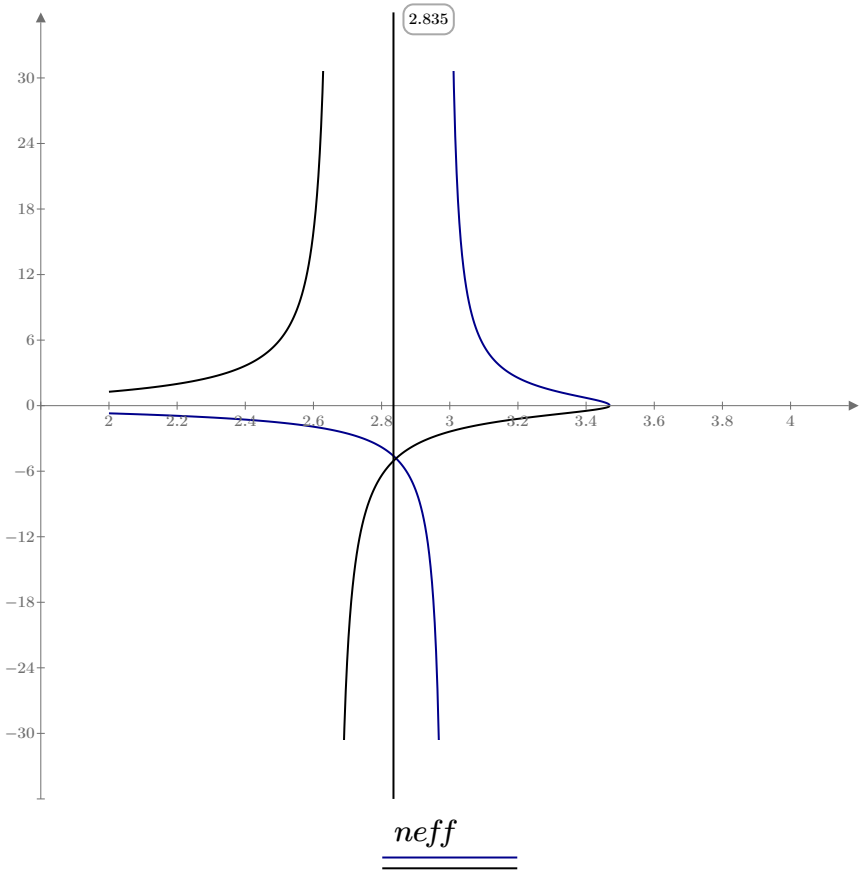
$k0 := \frac{2 \cdot \pi}{\lambda}$

$p(neff) := k0 \cdot \sqrt{neff^2 - nc^2}$

$q(neff) := k0 \cdot \sqrt{nf^2 - neff^2}$

$left(neff) := \tan(d \cdot q(neff))$

$right(neff) := \frac{2\ q(neff) \cdot p(neff)}{q(neff)^2 - p(neff)^2}$



Numerical solver (it uses the definition of variables set previously in the worksheet)

Guess Values

$$neff := 2.8$$

Constraints

$$\tan\left(d \cdot q\left(neff\right)\right) = \frac{2\ q\left(neff\right) \cdot p\left(neff\right)}{q\left(neff\right)^2 - p\left(neff\right)^2}$$

Solver

$$Neff := \mathbf{find}\left(\mathbf{neff}\right) = 2.842432$$

$$\beta := k0 \cdot Neff = \left(1.152 \cdot 10^7\right) \frac{1}{m}$$