

1. Calculation of focal length of thin lens of refractive index n_2 in medium with refractive index n_1 .

First surface

Second surface

r is positive for convex surface,
negative for concave surface

$$r_1 := -5$$

$$r_2 := 5$$

Refractive index of lens n_2

$$n_2 := 1$$

Refractive index of medium n_1

$$n_1 := 1.5$$

$$f := \frac{n_1}{\frac{n_2 - n_1}{r_1} + \frac{n_1 - n_2}{r_2}} \quad f = 7.5$$

2. Graph of focal length of thin lens with index n_2 depending on refractive index of medium n_1 .

The radii of curvature are chosen above. The range of n_1 is divided into lower and higher range because of singularity.

Refractive index of lens nn_2

$$nn_2 := 1.5$$

Lower range

Upper range

$$nn_1 := 1, 1.1 \dots nn_2 - .00001$$

$$nnn_1 := nn_2 + .1, nn_2 + .2 \dots 4$$

$$ff(nn_1) := \frac{1}{\frac{nn_2 - nn_1}{r_1} + \frac{nn_1 - nn_2}{r_2}}$$

$$fff(nnn_1) := \frac{1}{\frac{nn_2 - nnn_1}{r_1} + \frac{nnn_1 - nn_2}{r_2}}$$

