

GRAVITATIONAL LENSING

LECTURE 20

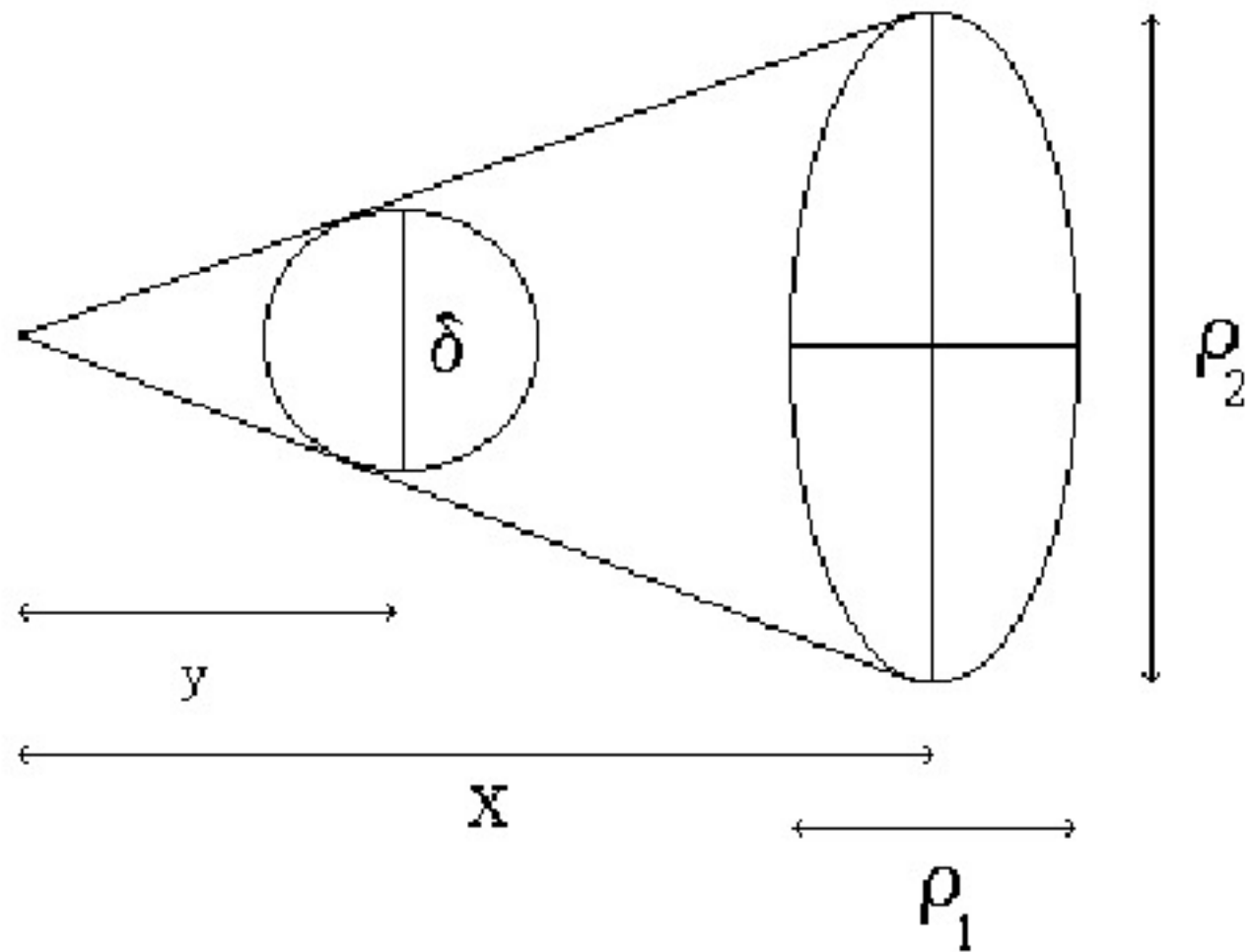
Docente: Massimo Meneghetti
AA 2016-2017

CRITICAL LINES

As seen in the past lecture, the radii of the critical lines of the axially symmetric lens are found using the lensing Jacobian:

$$\begin{aligned}\det A &= \frac{y}{x} \frac{dy}{dx} = \left(1 - \frac{m(x)}{x^2}\right) \left[1 - \frac{d}{dx} \left(\frac{m(x)}{x}\right)\right] \\ &= \left(1 - \frac{m(x)}{x^2}\right) \left(1 + \frac{m(x)}{x^2} - 2\kappa(x)\right) \\ &= \left(1 - \frac{\alpha(x)}{x}\right) \left(1 - \frac{d\alpha(x)}{dx}\right) .\end{aligned}$$

CRITICAL LINES



$$\frac{\delta}{\rho_2} = 1 - \frac{m(x)}{x^2}$$

$$\frac{\delta}{\rho_1} = 1 + \frac{m(x)}{x^2} - 2\kappa(x)$$

How are the images distorted near the critical lines?

RADIAL CRITICAL LINE

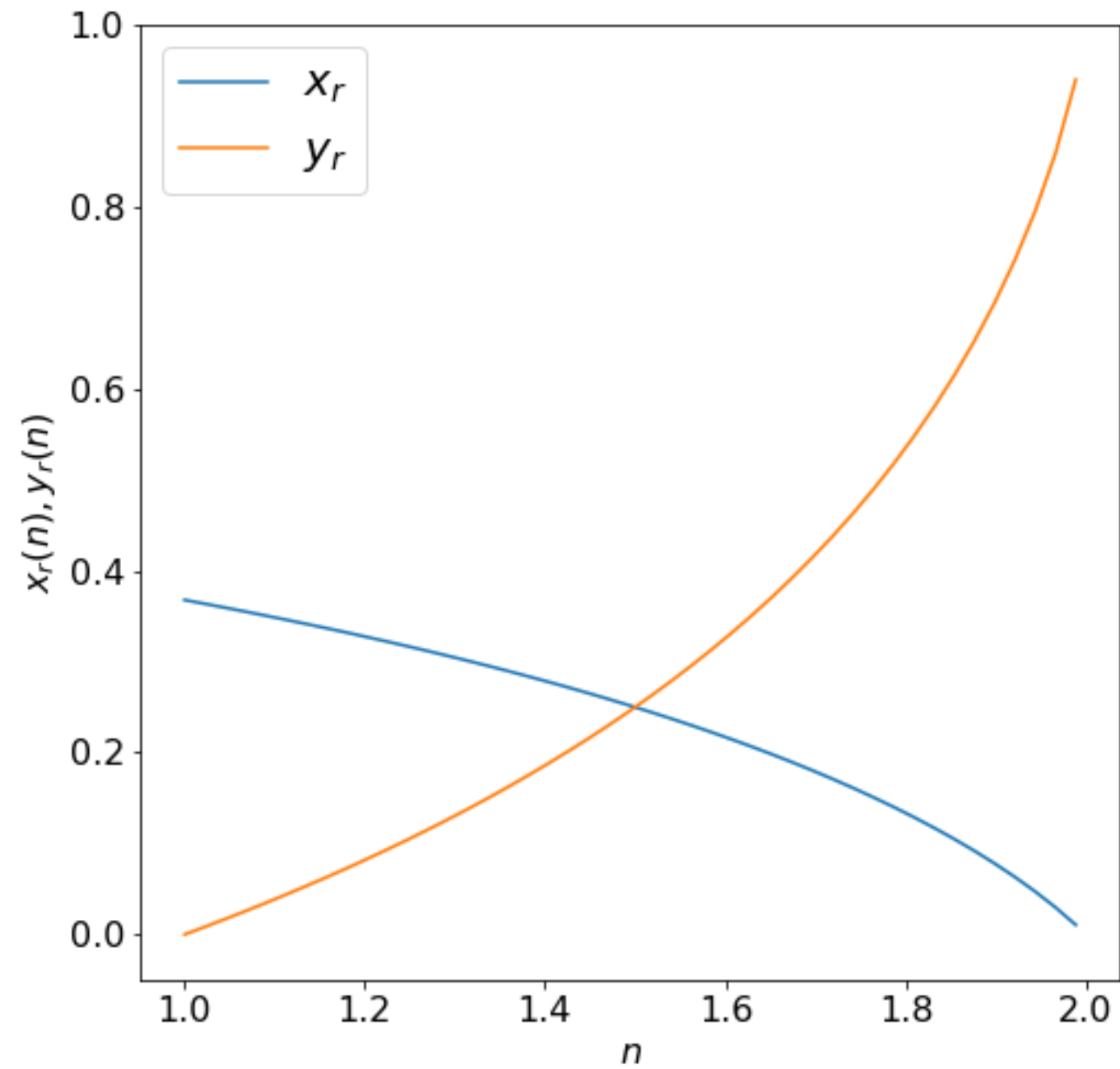


IMAGE DIAGRAM

.....

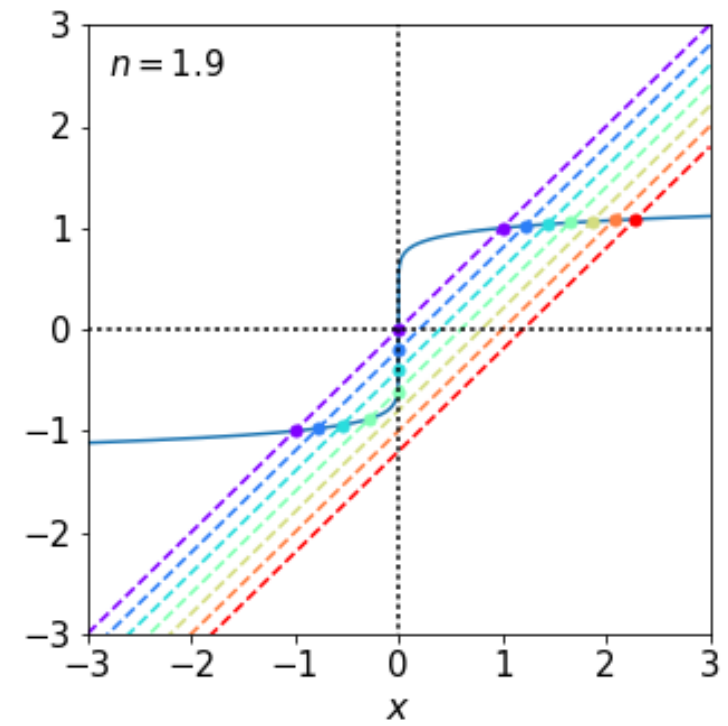
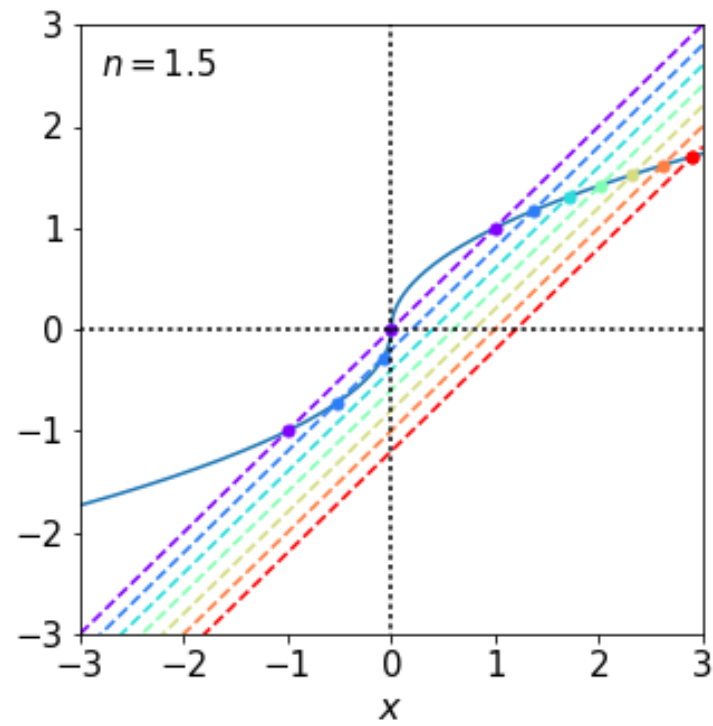
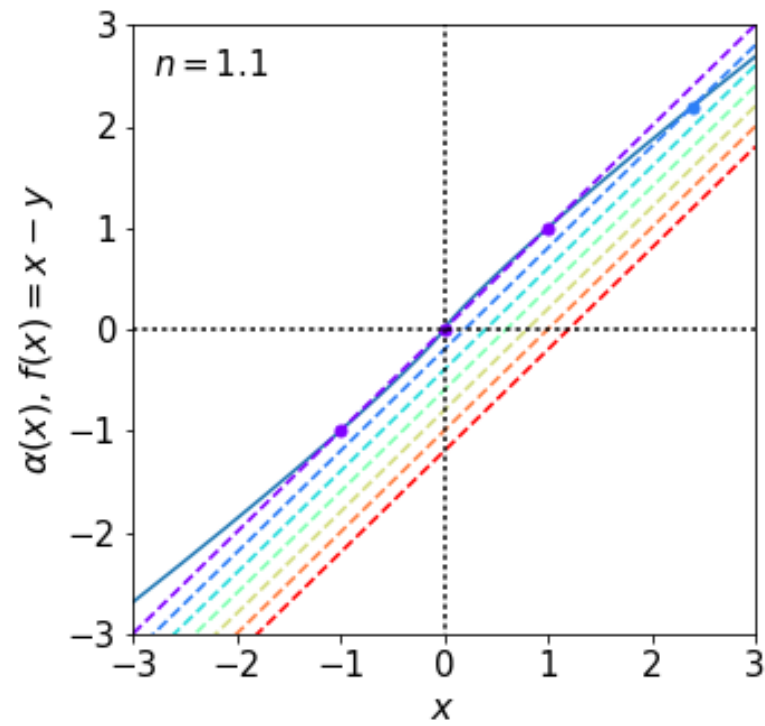


IMAGE MAGNIFICATIONS

.....

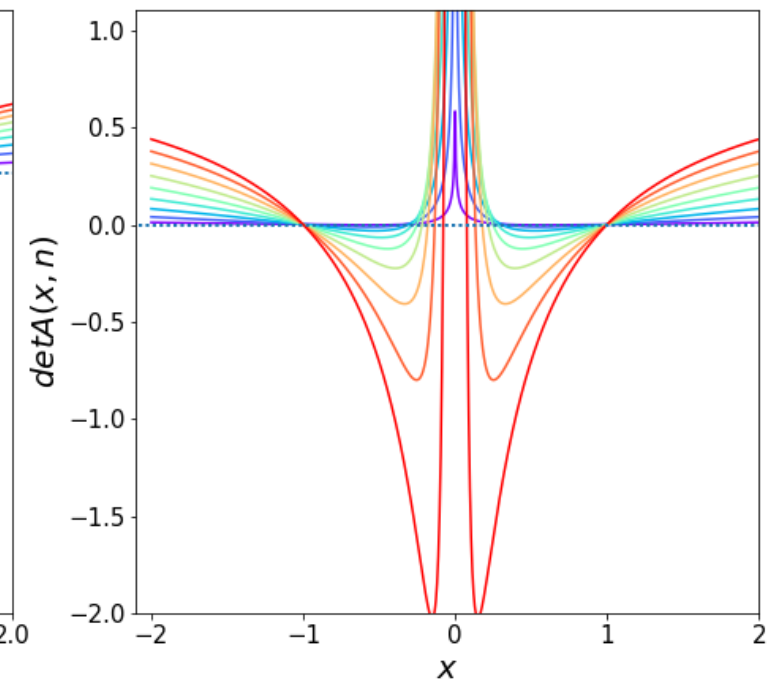
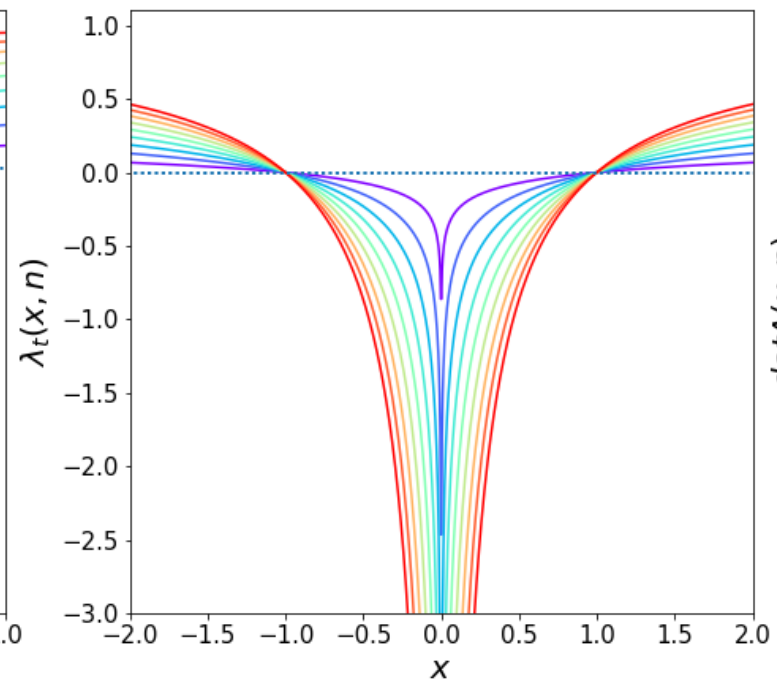
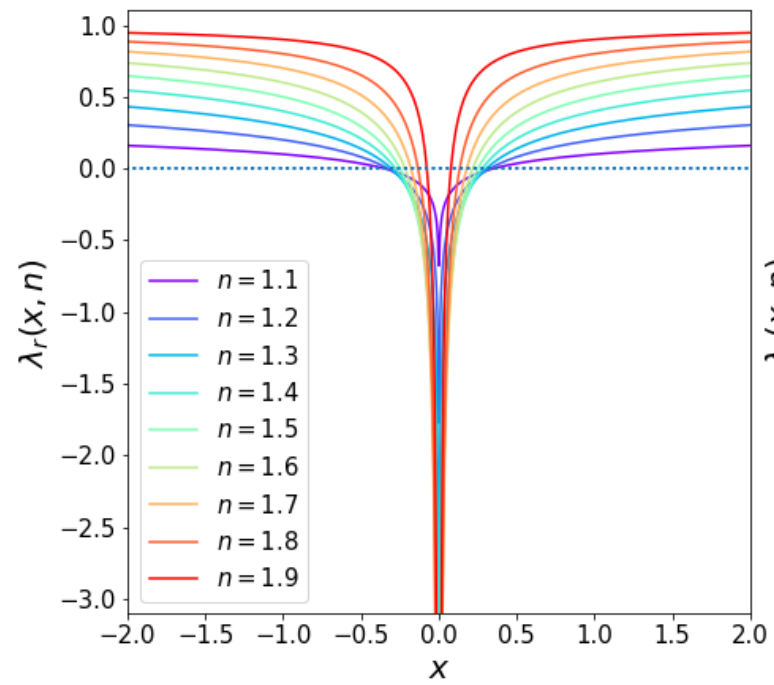


IMAGE MAGNIFICATIONS

.....

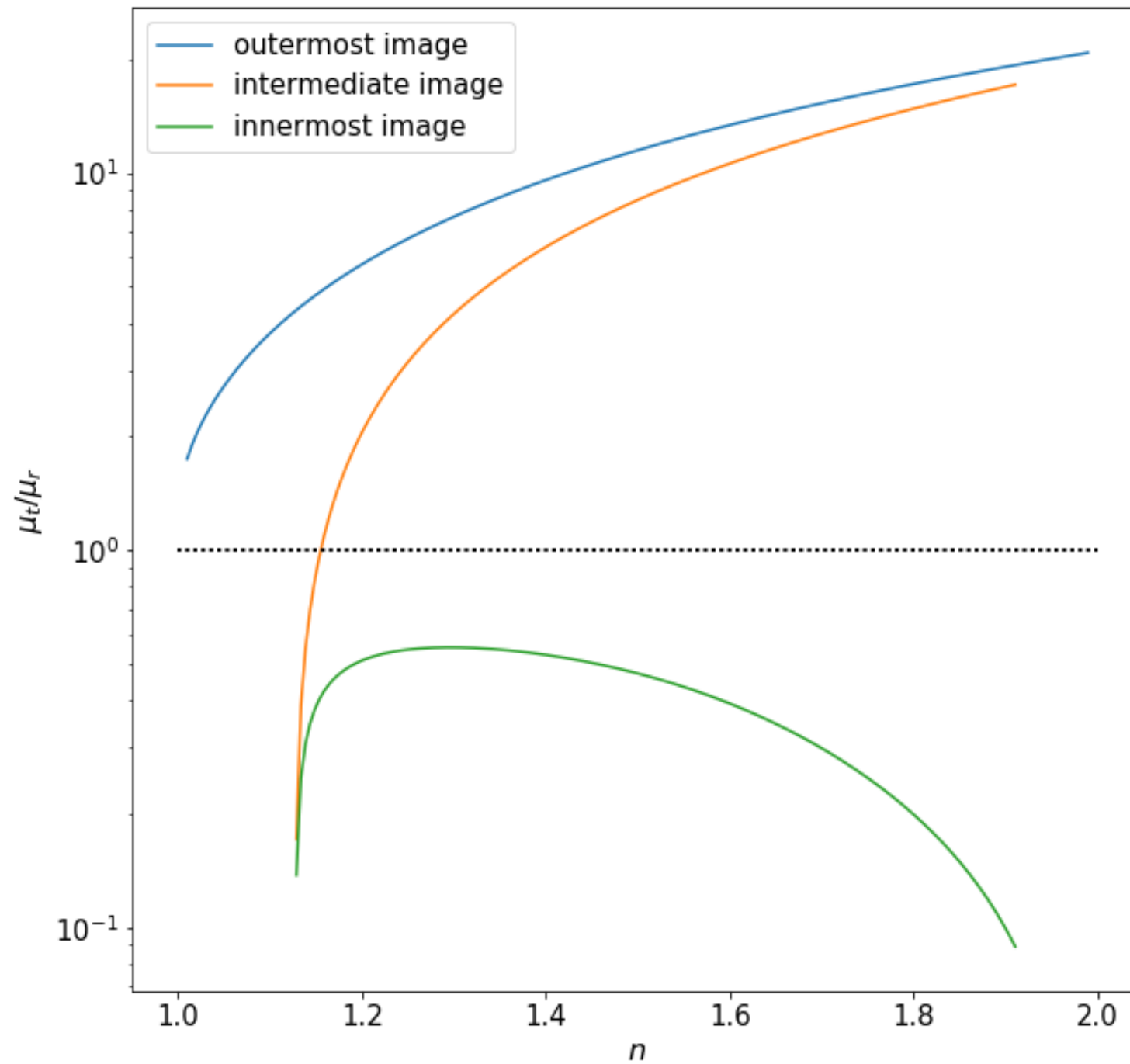


IMAGE DISTORTIONS

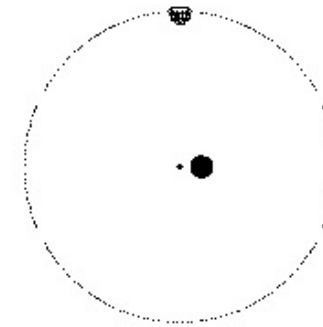
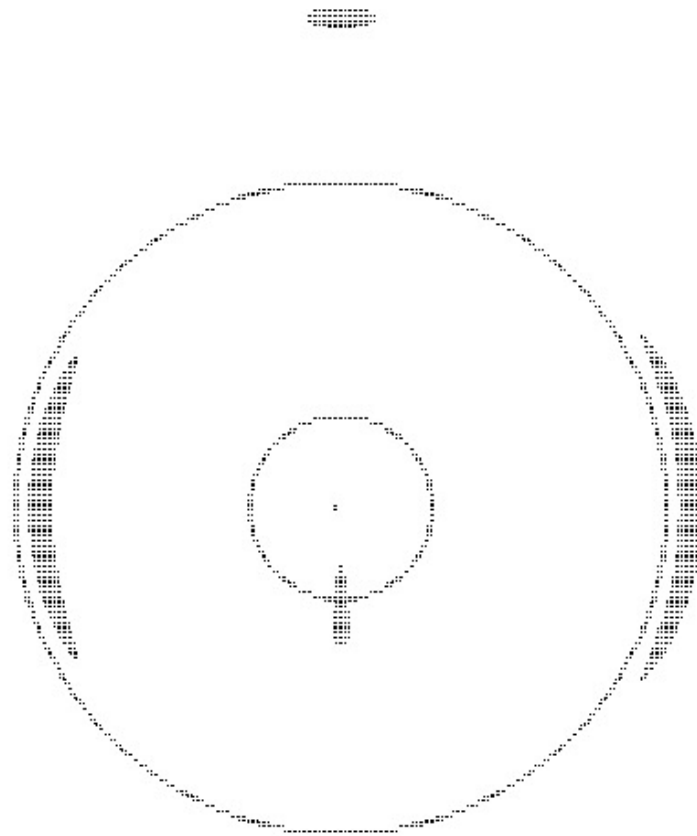


IMAGE DIAGRAM ($N > 2$)

.....

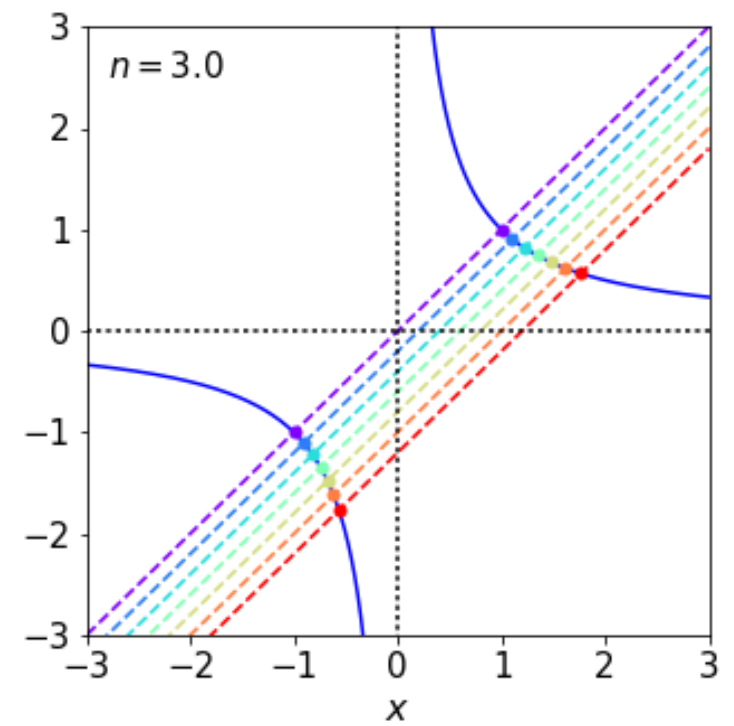
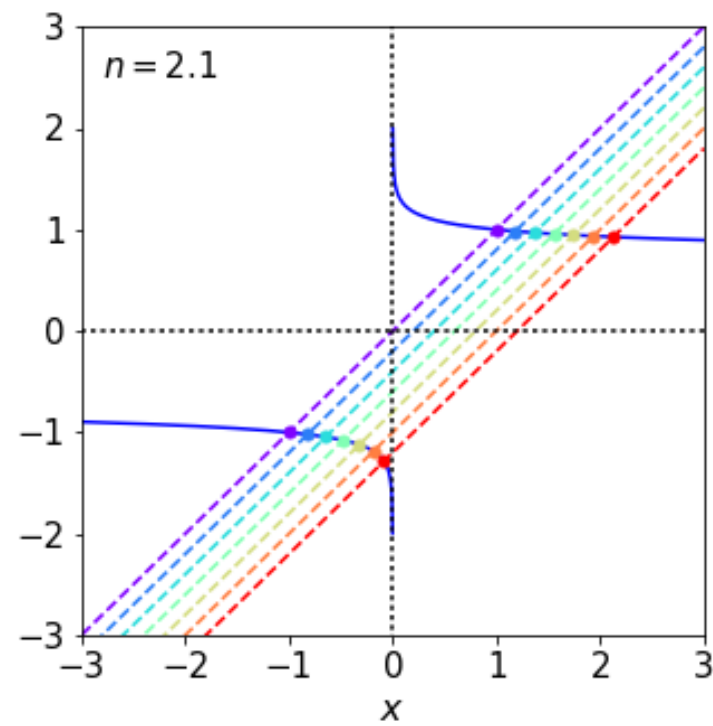
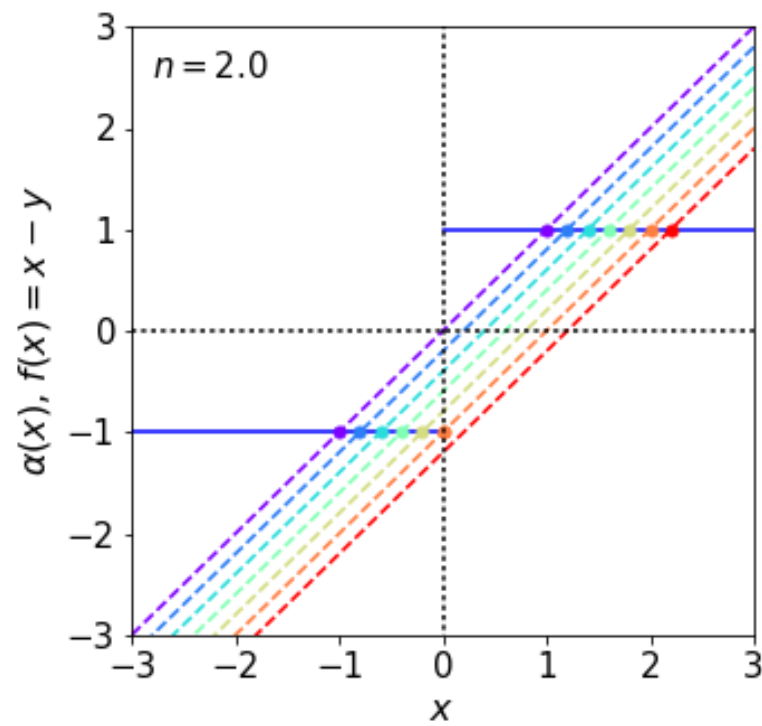


IMAGE MAGNIFICATIONS

.....

