

Cvičení 2

Průsečíky

Průsečík se sférou

Rovnice paprsku

$$R(t) = O + td$$

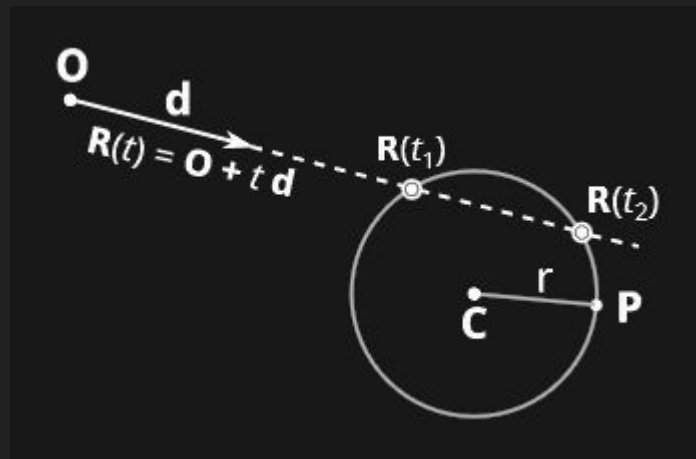
Rovnice sféry

$$(P - C)^2 = r^2$$

Průsečík

$$t^2 d^2 + 2(O - C) \cdot dt + ((O - C)^2 - r^2) = 0$$

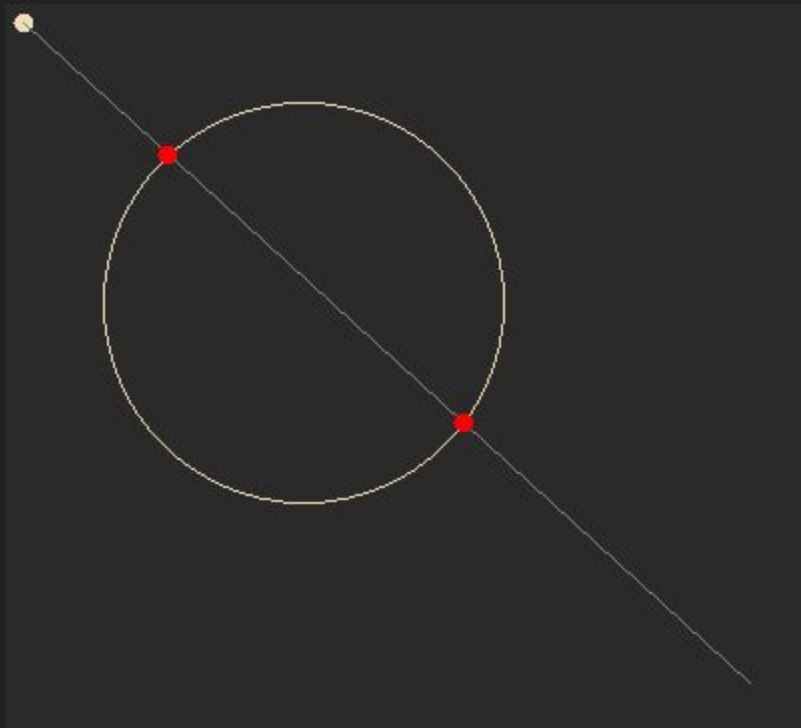
$D \geq 0 \Rightarrow$ existuje řešení



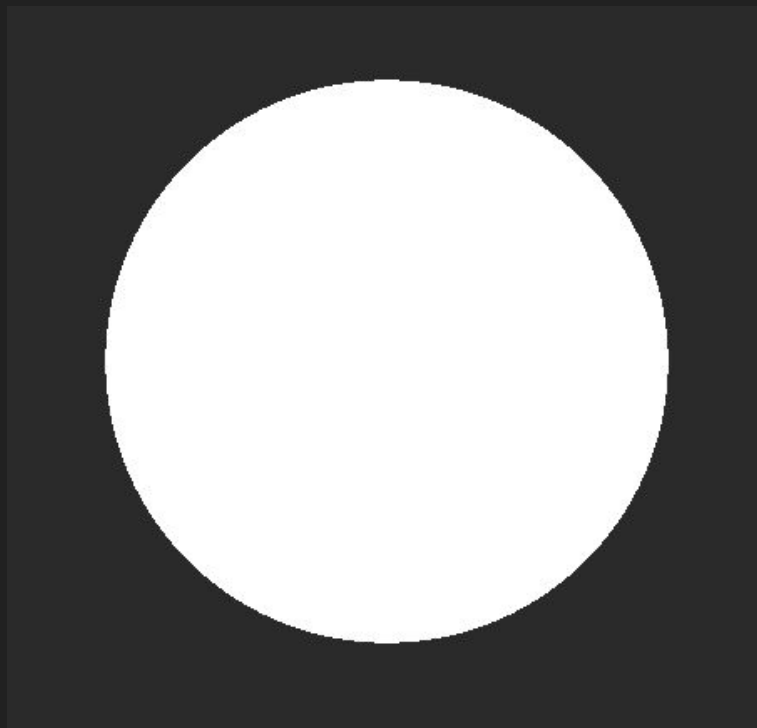
$$D = b^2 * 4acS$$

$$t_{1,2} = \frac{-b \pm \sqrt{D}}{2a}$$

Ve 2D



Pohled kamery



Průsečík s torusem

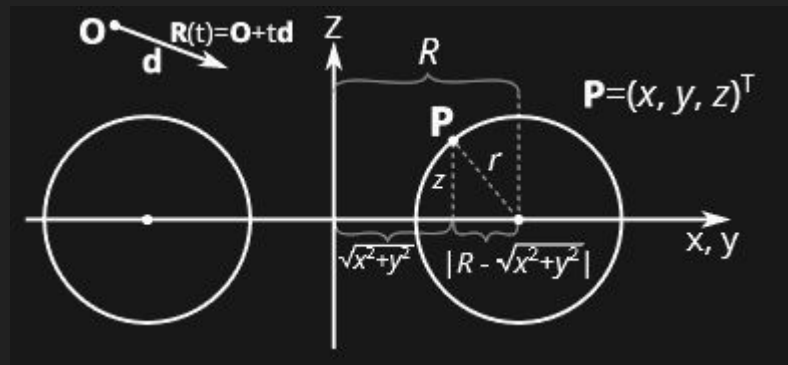
Rovnice paprsku

$$R(t) = O + td$$

Rovnice torusu

$$(R - \sqrt{x^2 + y^2})^2 + z^2 = r^2$$

=> Newtonova metoda



$$at^4 + bt^3 + ct^2 + dt + e = 0$$

$$a = (d^2)^2$$

$$b = 4d^2(O \cdot d)$$

$$c = 2d^2(O^2 - (R^2 + r^2)) + 4(O \cdot d)^2 + 4R^2d_z^2$$

$$d = 4(O \cdot d)(O^2 - (R^2 + r^2)) + 8R^2O_zd_z$$

$$e = (O^2 - (R^2 + r^2))^2 + 4R^2(O_z^2 - r^2)$$

Animace

