Problem

Given a circle of radius r, write a function $f(r)$ that gives the radius of a circle whose area is the square of the area of the original circle.

Bonus

Start with a circle of radius 10 and draw another circle of radius r inside it. What value of r makes the product of the areas of the inner and outer circles largest?

Solution

The square of the area of a circle of radius r is $(\pi r^2)^2 = \pi^2 r^4$. So if we make $f(r) = \sqrt{\pi} r^2$ then a circle of this radius will have area $\pi(\sqrt{\pi} r^2)^2 = \pi^2 r^4$ as desired.

Bonus Solution