Problem statement A circle with center on the y-axis is tangent to the parabola $y = x^2$ at the points $(1, 1)$ and $(-1, 1)$. Find its center and radius. A diagram is shown to the right.

Suggestion: Find the equation of the normal line to $y = x^2$ at the point $(1, 1)$, that is, the line that is perpendicular to the parabola (and circle) at $(1, 1)$. How can this be used to find the circle's center?