Problem: Show that two parabolas with the same focus, and whose axes do not lie along the same line, intersect in exactly two points.

Solution (by Hoan Duong, San Antonio College faculty, edited by the Panel)
Let the two directrices be $d_1$ and $d_2$, and let the common focus be $F$. Let $Q$ be an intersection of the two parabolas. Then $d(d_1, Q) = d(F, Q) = d(d_2, Q)$. Hence $Q$ is the center of a circle passing through $F$, and having $d_1, d_2$ as tangent lines. Since there are exactly two circles with this property, there are exactly two intersections.

At least partially solved by:

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