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Michael R. Raugh* (michael.raugh@gmail.com). *How did Leibniz solve the catenary problem?* Preliminary report.

In Acta Eruditorum of June 1691 Leibniz presented the first solution to the catenary problem as a classical straightedge-and-compass construction. Johann Bernoulli also presented a solution obtained by correctly formulating a differential equation derived from considerations of static equilibrium. Leibniz did not explain his derivation, and there are some oddities. His curve cannot be a catenary because e is not constructible. But he names features that can only be true for a catenary; a line segment equal to a specified arc and the tangent at a point. It is remarkable that his construction (with slight qualification) exhibits the catenary structured as a hyperbolic cosine, not then known by name or formulation. Another oddity: Bernoulli proves that Leibniz's construction was indeed a catenary! Did he not notice that it wasn't? For proof, he shows that the construction yields the same differential equation he had derived, but he began with a logarithmic curve correctly defined by a differential equation, thereby avoiding Leibniz's limitations of construction. I will present a simple solution obtained using methods that I believe were available to Leibniz. I don't claim he solved the problem in this way, but I do think that paths like this were open to him. (Received September 11, 2016)