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Erika David Parr* (erika.parr@mtsu.edu) and **Robert Ely** (ely@uidaho.edu). *A hypothetical learning trajectory for conceptualizing distances on Calculus graphs*. Preliminary report.

A Cartesian coordinate pair (x, y) is not just a name for a point in the plane; it is a description of the horizontal and vertical (signed) distances between the origin and that point. It is crucial to view coordinates as representing distances between points in order to understand many Calculus ideas, including areas under and between curves (e.g., $f(x) - g(x)$ is a vertical length), volumes of solids of rotation, and the definition of the derivative. Yet research has shown that undergraduate students, even those who have taken multiple Calculus courses, may not conceive of distances when reasoning about related expressions on graphs (Parr, 2020). We present a hypothetical learning trajectory for developing student reasoning about distances in the Cartesian coordinate system with variable and function notation. We will discuss our plans to try out and refine this hypothetical learning trajectory, as well as directions for future research. (Received July 30, 2020)