1125-34-1911 **Paul Eloe**, 300 College Park, Dayton, OH 454692316, and **Tyler Masthay***
(tmasthay1@udayton.edu), 300 College Park, Dayton, OH 454692316. *Uniqueness implies existence of solutions for three-point boundary value problems for fractional differential equations.*

Let $a < b$ and assume $2 < \alpha \leq 3$. For each

$$a < x_1 < x_2 < x_3 < b, \quad y_1, y_2, y_3 \in \mathbb{R},$$

consider boundary value problems for the fractional differential equation

$$D^{\alpha}_{*x_1} y(x) = f(x, y(x), y'(x), y''(x)), \quad x_1 < x < b, \tag{1}$$

with boundary conditions

$$y(x_1) = y_1, \quad y(x_2) = y_2, \quad y'(x_2) = y_3, \tag{2}$$

or

$$y(x_1) = y_1, \quad y(x_2) = y_2, \quad y(x_3) = y_3, \tag{3}$$

where $D^{\alpha}_{*x_1} y(x)$ denotes the Caputo fractional derivative of order α. We obtain sufficient conditions such that if solutions of (1), (3) are unique when they exist, then for all $a < x_1 < x_2 < x_3 < b$, $y_1, y_2, y_3 \in \mathbb{R}$, solutions of (1), (2) and solutions of (1), (3) exist.

As part of the development, a compactness criterion for families of solutions of (1) is obtained. (Received September 19, 2016)