1077-G5-324 **James H. Fife*** (jfife@ets.org), Mail Stop 13-E, Educational Testing Service, Rosedale Road, Princeton, NJ 08541. *Cubic Splines, Local Extrema, and the Harmonic Mean: An Application to Graph Editors.*

A graph editor is an applet that, when inserted in an Internet-delivered test question, allows the examinee to enter a graph as a response. One way in which a graph editor can capture the graph of a smooth function is for the student to click on a series of points that lie on the graph. The editor then connects the points with a smooth curve; e.g., a cubic spline. If it is desired that the curve has a local extremum at a certain point, the derivative of the spline can be constrained to be zero at that point. But while the condition that the derivative equal zero is certainly necessary for the curve to have a local extremum, it is well known not to be sufficient. In 2003 Kruger claimed that a sufficient additional condition is to constrain the derivative at non-extreme points to be the harmonic mean of the adjacent secant lines. At least, he claimed that that constraint "works well". In this talk, we prove Kruger's claim. We also investigate the effect of constraints that use the arithmetic mean or the geometric mean. Finally, we unify our results through the power mean. (Received August 22, 2011)