1067-62-1305 **Jeffrey Liebner*** (liebnerj@lafayette.edu), 500 McCartney Street, Easton, PA 18042, and **Julie Michelman**, **Micah Pearce** and **Jiaqi Li**. *Working with Cubic Splines and Neural Data.* Preliminary report.

Curve fitting attempts to find a smooth function that describes the trend of data given in (x_i, y_i) pairs. Cubic splines, of which smoothing splines are one type, are piece-wise cubic functions commonly used to fit such data. The smoothing spline fit f minimizes the penalized sum of squares $PSS(f) = \sum (y_i - f(x_i))^2 + \lambda \int (f''(x))^2 dx$ where the first term is the residual sum of squares and the second is a global smoothing parameter λ multiplied by a penalty for curvature. Smoothing splines generally perform well unless the curvature of the data is highly variable, in which case they tend to overfit smoother areas and underfit areas with sharp curvature. We develop an algorithm to fit smoothing splines with a variable smoothing parameter, which accounts for local changes in curvature. Our automated algorithm finds the optimal smoothing parameter value at each point using cross validation in a local window and then uses this set of parameter values to calculate the fit. On data with trends that have highly variable curvature, our fits consistently have lower mean integrated squared error and better coverage for confidence intervals than ordinary smoothing spline fits. (Received September 20, 2010)