

Homework 1

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1 Finite Differencing in Curved Coordinates

2 Differentiation and Integration with Noise

$$f(x) = \sin(x)e^{\cos(x)} \quad (1)$$

$$f'(x) = (\cos(x) - \sin^2(x))e^{\cos(x)} \quad (2)$$

2.1 Differentiation using Stencils

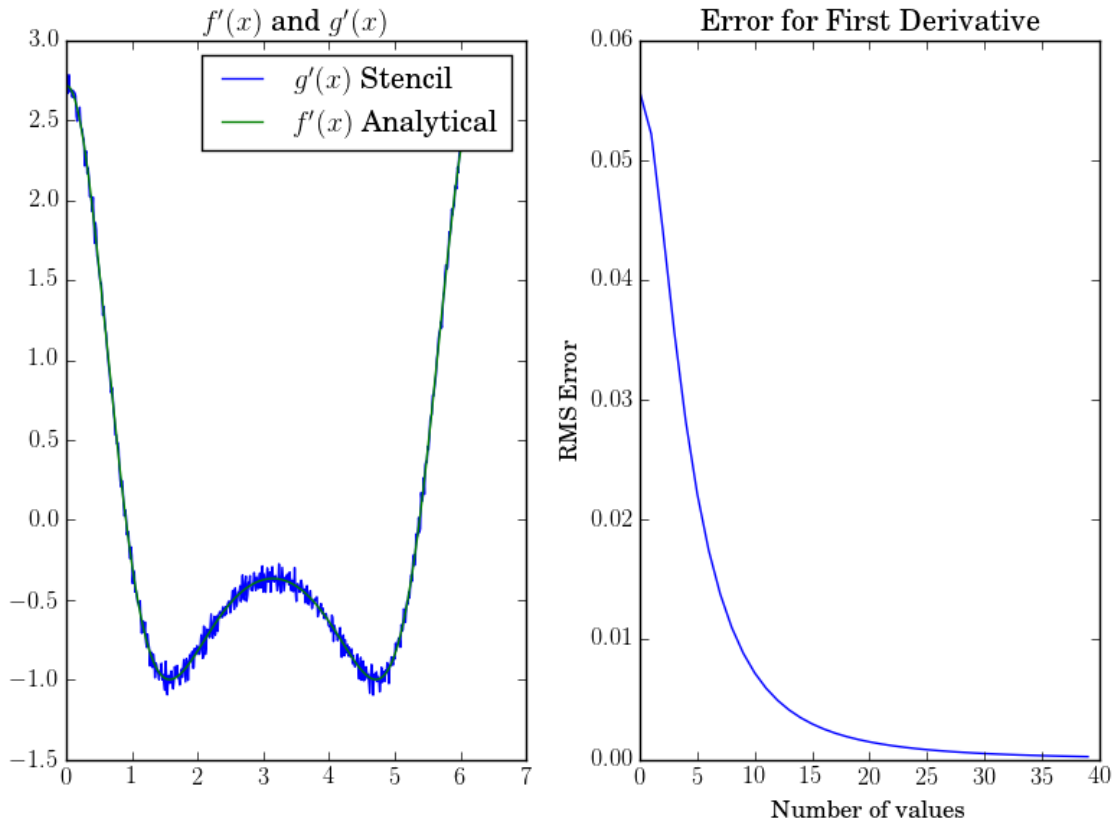


Figure 1: RMS Error in 5 point stencil for the first derivative

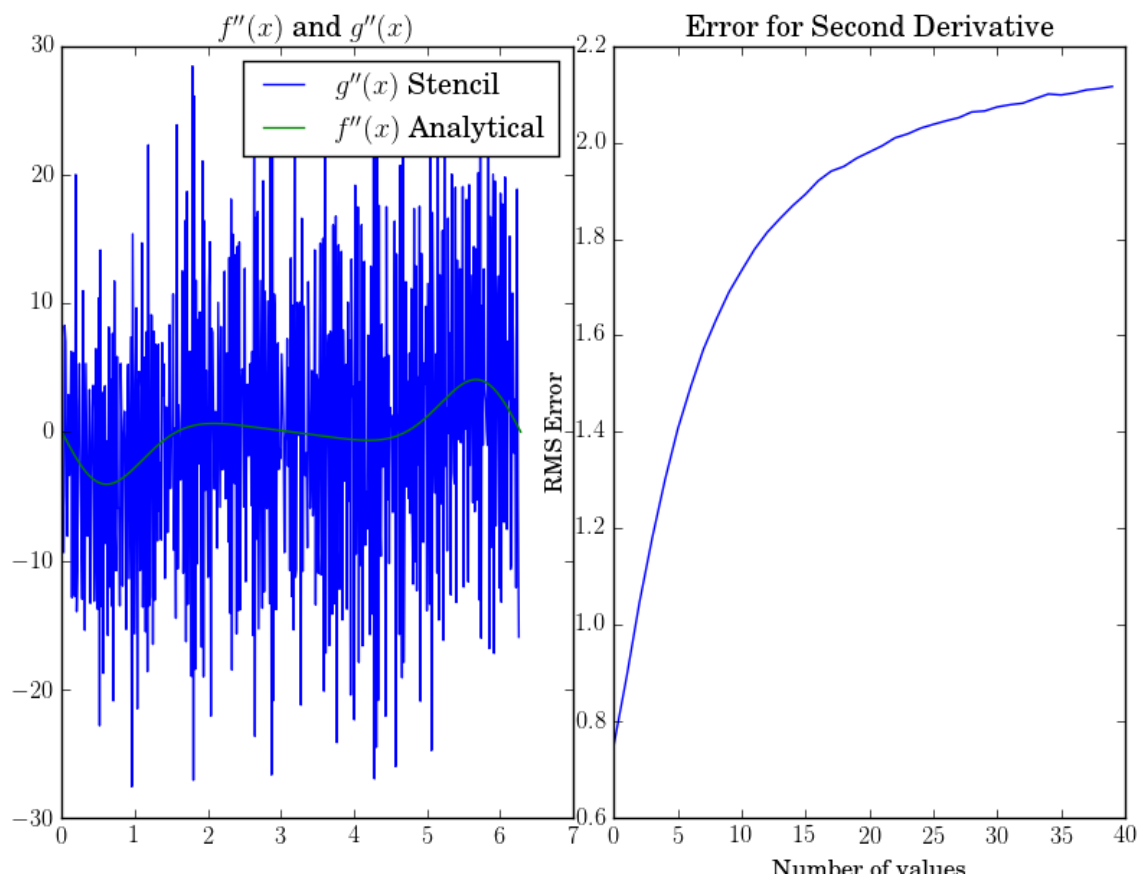


Figure 2: RMS Error in 5 point stencil for the second derivative

2.2 Integration with Simpson's Rule

3 Cepheid Lightcurve Integratiton

4 Planck's Law

5 Romberg Integration

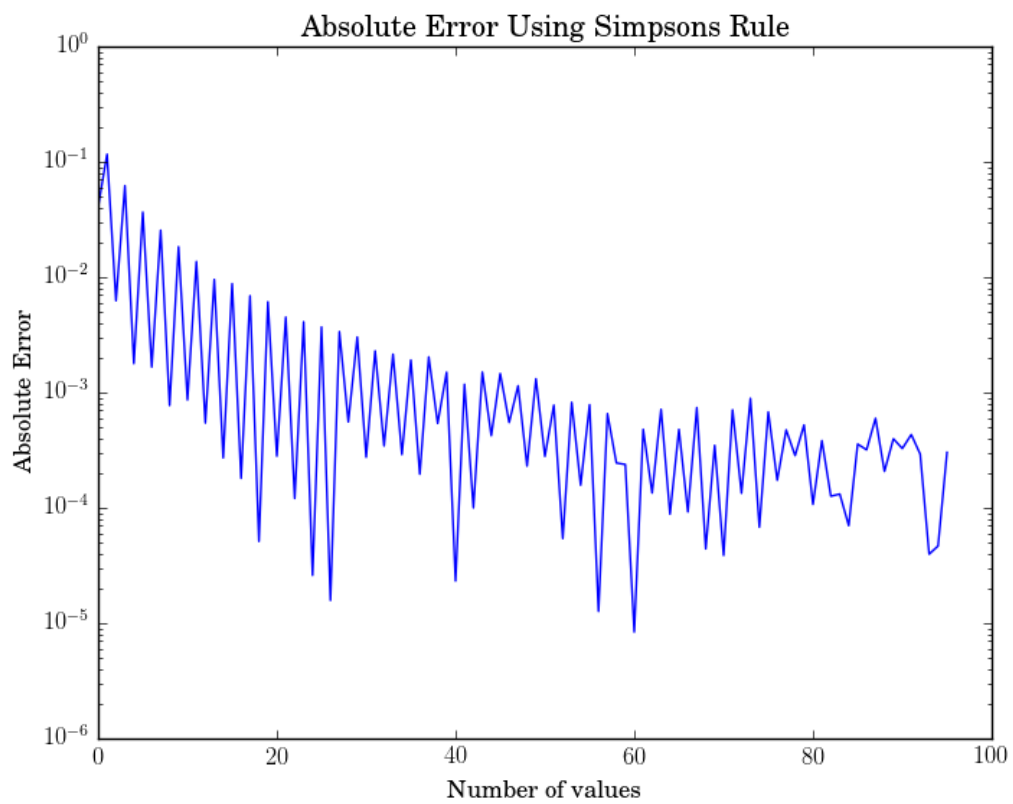


Figure 3: RMS Error using Simpson's Rule for varying numbers of points