**MA 3457 / CS 4033**

**Conference on 11/18**

In class, we defined the optimal *h* for the centered difference approximation of *f’(xo)* that was *O(h2).* Here is a screen shot of the power point slides that went over that.

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1. Write a matlab code and create a graph that shows that this theoretical optimal *h* actually matches with the computations for the function f(x)=x2ln(x) evaluated at the point *x=2*.

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This is from Burden & Faires 8.1. We also derived this *O(h4)* derivative approximation using Richardson Extrapolation and utilizing a linear combination of *O(h2)* derivative approximations.

1. A. Prove that the optimal *h* that minimizes both the computational and truncation

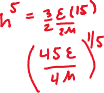
error (and gives the best / lowest error derivative approximation) when using the

above five-point midpoint formula *O(h4)* approximation is:

*h=*

B. For the function f(x)=x2ln(x) evaluated at the point *x=2*, show that this theoretical

optimal *h* actually matches with the computations



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1. A. Evaluate the following integral using Trapezoidal rule.
2. What is the actual error of this approximation?
3. What is the theoretical upper bound?

