Homework Assignment for Week 16

Assigned Dec 31, 2010.

1. Section 6.2: Problems 1(a), 3(a), 5(a), 31.

2. (corrected) Continue from last week's homework problem, show that if $p < -1$, and c_i is an arbitrary point in the interval $[x_{i-1}, x_i]$, then $h\sum_{i=2}^{n} c_i^p - \int_h^1 x^p dx = O(h^{p+1})$ (which implies that $h\sum_{i=2}^{n} c_i^p = O(h^{p+1})$, $p < -1$ and $h\sum_{i=1}^{n} x_{i-\frac{1}{2}}^q - \int_0^1 x^q dx = O(h^{q+1})$, $-1 < q < 1$).

   Hint: use monotonicity of the function x^p.

   Remark: for general $r \in R$, $h\sum_{i=2}^{n} x_{i-\frac{1}{2}}^r - \int_h^1 x^r dx = O(h^{\min\{r+1,2\}})$

3. Continue on previous problem, can you predict the order of convergence of Simpson's rule applied to $\int_0^1 x^p dx$, $-1 < p < 3$? Verify your answer numerically.