

**Group Project: preparation for computer lab II**  
**Computational Physics 4480/7680, Astro 7690**

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1. **Monday choice:** *Before coming to class Wed Feb 5, each group should look into a few of the methods described in Numerical Recipes for evaluating functions,*

(a) *Taylor series*

(b) *Linear interpolation*

(c) *Splines*

(d) *Polynomial interpolation*

(e) *Least squares fit polynomial (use Legendre functions, not covered in NR)*

(f) *Chebyshev polynomials*

(g) *Padé approximants*

(h) *Rational function interpolation*

(i) *Barycentric rational interpolation*

(j) *Chebfun (cool Matlab scientific environment: see Web)*

(k) *Other?*

*In class Wednesday each group will sign up for one or two methods. (Groups with stronger backgrounds in scientific computing should choose methods farther down along the list.)*

2. **Friday implementation:** *Before computer lab on Friday Feb 14, each group should implement, debug, and optimize the method or methods they have chosen, to efficiently approximate  $\sin(x)$  in the range  $[0, 2\pi)$ : Use the programming environment of your choice. In computer lab we shall assist you in converting the codes into a unified C++ class structure to facilitate speed tests. Do set up your code so that it is convenient to vary the order of approximation (the number of interpolation points, the degree of the function, etc.)*