Math 151a

• Midterm exam on Friday, May 11.
Sections covered for the midterm: 1.2, 2.1, 2.2, 2.3, 2.4, 3.1, and 3.2.
Solutions to selected exercises and sample questions are posted on the class webpage.

Homework #5. Due on Friday, May 11

[**1**] Let $f(x) = \sin(\pi x)$ and $x_0 = 1$, $x_1 = 1.25$, and $x_2 = 1.6$.
   (a) Construct interpolation polynomials of degree at most one and at most two to approximate $f(1.4)$ and find the absolute error.
   (b) Use the theorem expressing the error in Lagrange interpolation to find an error bound for the approximations.

[**2**] Show that $\max_{x_j \leq x \leq x_{j+1}} |g(x)| = \frac{h^2}{4}$, where $g(x) = (x - jh)(x - (j+1)h)$.

[**3**] Use Neville's method to obtain the approximations for Lagrange interpolating polynomials of degrees one, two and three to approximate the following:

$f(0.43)$ if $f(0) = 1$, $f(0.25) = 1.64872$, $f(0.5) = 2.71828$, $f(0.75) = 4.48169$.

[**4**] Suppose $x_j = j$ for $j = 0, 1, 2, 3$ and it is known that

$$P_{0,1}(x) = 2x + 1, \ \ P_{0,2}(x) = x + 1, \ \ \text{and } P_{1,2,3}(2.5) = 3.$$

Find $P_{0,1,2,3}(2.5)$.

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