

Prof. Ming Gu, 861 Evans, tel: 2-3145  
Office Hours: MWF 1:00-2:00PM  
Email: [mgu@math.berkeley.edu](mailto:mgu@math.berkeley.edu)  
<http://www.math.berkeley.edu/~mgu/MA128A2008S>

## Math128A: Numerical Analysis

### Programming Assignment #1, Due Feb. 29, 2008

---

Consider the function  $f(x) = (x - 1)^9$ .

1. Use the `matlab` function `randn` to generate  $n + 1$  random nodes  $x_0 < x_1 < \cdots < x_n$  where  $n = 9$ .
2. Use the interpolation formula (3.1) in the text, the Neville's method, and divided differences to interpolate  $f(x)$  at  $n$  random points. This leads to three mathematically identical but numerically different approximations to  $f(x)$ . Furthermore, since  $f(x)$  has degree 9, all four of them are mathematically identical.
3. For each of the four polynomials, use the bisection method, Newton's method, and the Muller's method to compute a root. Compare the accuracy in these roots. Note that for Newton's method, you will need to derive formulas for the derivative calculations.