

MATH 170B: Discussion 5

May 2018

Contractive mapping

1. Use the contraction principle to show that the equation $x^3 + x^2 - 6x + 1 = 0$ has a unique real solution over the interval $[-1, 1]$.

Polynomial interpolation

2. Write the Lagrange and Newton interpolating polynomials for these data:

x	2	0	3
$f(x)$	11	7	28

3. Prove that if we take any set of 23 nodes in the interval $[-1, 1]$ and interpolate $f(x) = \cosh(x)$ with a polynomial p of degree 22, then the relative error $\frac{|p(x)-f(x)|}{|f(x)|} \leq 5 \times 10^{-16}$ on $[-1, 1]$.