

Problem Set 6, due Monday, February 23

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2: Given a smooth function $f : \mathbb{R} \mapsto \mathbb{R}$, and a point x_* such that $f(x_*) = 0$ and $f'(x_*) \neq 0$, show that there exist M and ϵ depending on f and x_* so that if $|x_0 - x_*| < \epsilon$, and x_k are the Newton iterates of f started at x_0 , then x_k tends to x_* , and $|x_{k+1} - x_*| \leq M|x_k - x_*|^2$.

3: Write a matlab program that takes as input $f : \mathbb{R}^2 \mapsto \mathbb{R}^2$, a 3d degree polynomial in two variables (choose your favorite representation for the polynomial), and a guess at a zero, and runs Newton's method for finding zeros. Decide on a convergence criterion, and either output the zero if the method converges, or a non-convergence flag.