MATH 3451 Homework Assignment 2

Instructions: Solve and turn in all of the assigned problems. Problems marked with a * must be done by graduate students, and may be attempted by undergraduates for extra credit.

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Due on Thursday, October 3rd at the beginning of class.

Section 1.4 (page 29): 1(a,b,g)

Section 1.5 (page 38): 1, 2 (for problem 2, you do not have to justify your graph, you can find the form through experimentation/computer assistance. You should write a proof, using your graph, that there are 2^n periodic points of period n though.)

• Prove that if p is periodic with period k (i.e. $f^k(p) = p$), then every point in the orbit of p has the same derivative under f^k, i.e.

$$(f^k)'(f^i p)$$

is the same for $i = 0, 1, \ldots, k - 1$.

• Prove that if $0 < \mu < 1$ and $f_\mu(x) = \mu x(1 - x)$, then for every $x \neq p_\mu$, the orbit $(f_\mu)^n(x)$ approaches either $-\infty$ or 0.

•* If f is a C^1 function and H is the set of hyperbolic fixed points of f, prove that every point of H is isolated. (Hint: Mean Value Theorem!)