# Additional HW problems for Chapter 3 for graduate students.

Required for graduate students, other students may attempt it but no credit will be given. Turn in separately from the textbook assignment.

**1.** **(a)** Prove that if $\{x_n\}$ is an orbit of continuous function $f$ and $\lim_{n\to\infty} x_n = a$, then $a$ is a fixed point of $f$.

**(b)** Provide a counterexample to the statement (a) when $f$ is not continuous.

**(c)** If $\{x_n\}$ is an orbit of continuous function $f$, $\lim_{n\to\infty} x_{2n} = b$ and $\lim_{n\to\infty} x_{2n+1} = c$, what can you say about points $b$ and $c$? Prove your statement.

**2.** Show that an orbit of any rational point under the doubling function is eventually periodic or eventually fixed.