# PHYSICS 102
# CLASSICAL MECHANICS LAB
# FALL 2013

## Assignment Three

## Due Wednesday, October 30, 7;00 pm.

[1.] Write a code to iterate $x_{n+1} = 1 - \mu x_n^2$. Print it and hand it in.

[2a.] Run your code for $\mu = 0.5$ and the three initial values $x_0 = 0.25, 0.50, 0.75$. What happens?

[2b.] Compute the fixed point of the map analytically and show your code is doing the right thing.

[3a.] Run your code for $\mu = 1.1$ and the three initial values $x_0 = 0.25, 0.50, 0.75$. What happens?

[3b.] Compute the fixed points of the twice-iterated map analytically and show your code is doing the right thing.

[4.] Run your code for $\mu = 1.3$ and the initial value $x_0 = 0.25$. What happens?

[5.] Run your code for $\mu = 1.5$ and the initial value $x_0 = 0.25$. What happens?

[6.] Make plots of $x(n)$ vs $n$ for $x_0 = 0.25$ and the four $\mu$ values above.

[7.] Extra Credit! Do a 'stability analysis' of the fixed point and show that it goes unstable at $\mu = 0.75$. I can discuss this in more detail with you, but the idea is to start $x_0$ at a value slightly shifted from the fixed point and decide whether the dviation increases or decreases after an interation.