Mth253 Lab 4 NAME ______________________________

Write a SINGLE page summary of your observations of the sequence defined below. Be sure to discuss what you have observed and what, if any, conclusions you have reached.

The sequence $\{x_n\}_{n=0}^{\infty}$ is defined by: $0 < x_0 < 1$ and $x_{n+1} = f(x_n)$.

That is, let x_0 be arbitrarily chosen and let $x_1 = f(x_0)$, $x_2 = f(x_1)$, $x_3 = f(x_2)$ ... and so on. This recursive formula now forms a sequence based on f(x). We are interested in the *logistic* equation, namely

$f(x) = Ax(1-x) =$ with $A > 0$. Recall the *logistic equation* for population growth is $\frac{dP}{dt} = (a - bP)P$

Basic algebra tells us that $x = t \Rightarrow f(x) = g(t)$ so, $\Rightarrow \{x_n\}_{n=0}^{\infty} = \{t_n\}_{n=0}^{\infty}$. However, if $x \neq t$ then f(x) *may or may not* be equal to g(t). If $x \approx t \Rightarrow f(x) \approx g(t)$ then we say the sequence dependence on x_0 is stable, conversely if $x \approx t$ but $f(x) \not\approx g(t)$ we say that dependence on x_0 is unstable.

PRGM SEQ This program will greatly facilitate your observations

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:ClrHome
:Prompt A, X
:Disp X
:For (I,1,N,1)  (preset 10 STO► N)
:Disp Y1
:Y1 STO► X
:Pause
:End
```

- Let A = 1.9 and $x_0 = .1 = t_0$. Repeat for A = 2.2, 2.8, 3.2, 3.8, 4.0.
  Do $\{x_n\}$ & $\{t_n\}$ converge? If so, what are the limits?

- Let A = 1.9, $x_0 = .1$ and $t_0 = .3$. Repeat for A = 2.2, 2.8, 3.2, 3.8, 4.0.
  Do $\{x_n\}$ & $\{t_n\}$ converge? If so, what are the limits?

This writing assignment will be graded on mathematics, writing style, organization appearance and completeness. There is no advantage to typing this assignment unless you cannot write neatly. **MAXIMUM LENGTH IS ONE SIDE OF ONE PAGE!**

--INCLUDE THIS PAGE AS A COVER SHEET--