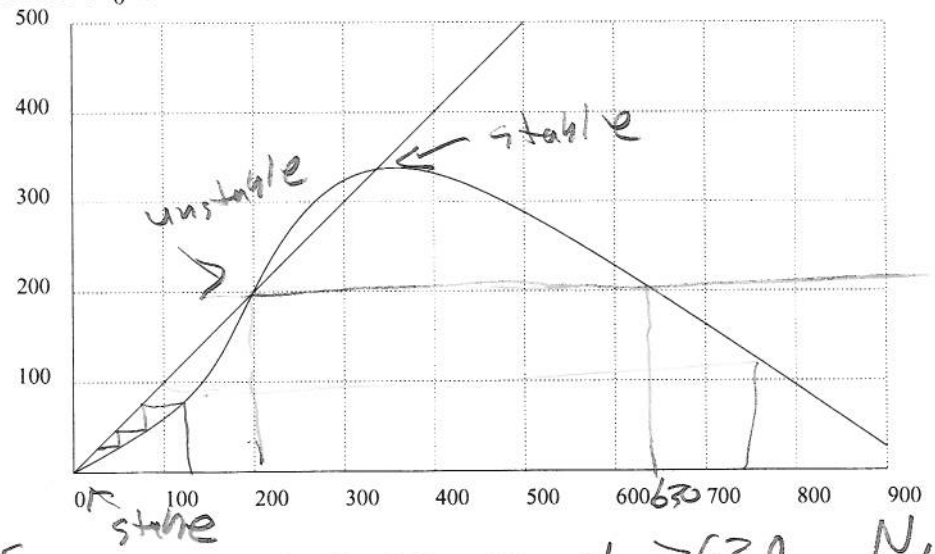
Mathematics 172

Quiz #11 Name: Key

You must show your work to get full credit.

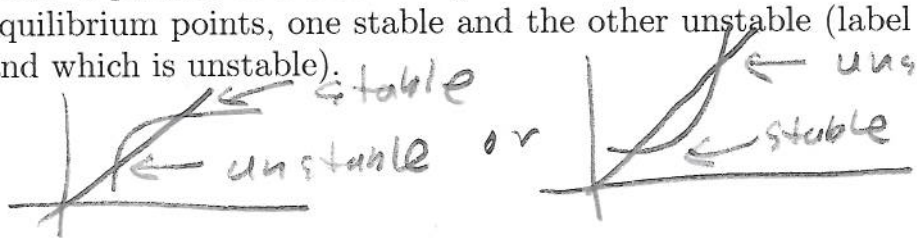
(1) In the figure below what happens to N_t for large values of t? (This will depend on the value of the initial condition N_0, so your answer should be some thing it "when N_0 is between ** and *** then $N_t \approx ***$ for large t, and if N_0 is ...".



For $N_0 < 200$ or $N_0 > 630$ $N_t \to 0$

For $200 < N_0 < 630$ $N_t \to 200$

(2) Draw a picture of a discrete dynamical system where that has exactly two equilibrium points, one stable and the other unstable (label which is stable and which is unstable).



(3) For the discrete dynamical system

$$N_{t+1} = N_t e^{.8\left(1-\frac{N_t}{500}\right)}$$

find all the equilibrium points and classify as to stable and unstable.

solve $N = N e^{.8(1-N/500)}$

This gives $N_1 = 0$ (unstable from graph)

and at $N_2 = 500$ $\frac{dy}{dx} = .2 < 1$

so $N_2 = 500$ is stable.