

1. Suppose that a population of deer grows logistically with an intrinsic growth rate of 25% and a carrying capacity of 1600.

- (a) Carefully sketch a graph of the growth rate of this deer population as a function of population.

Your graph should be a line with vertical intercept of 0.25 and horizontal intercept of 1600.

- (b) Determine a discrete dynamical system to model this deer population.

$$u(n) = u(n-1) + 0.25u(n-1) \left(1 - \frac{u(n-1)}{1600}\right)$$

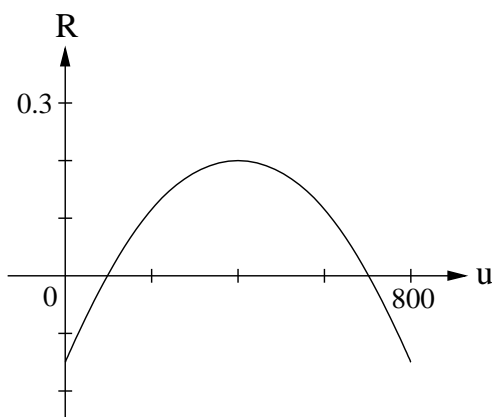
- (c) Determine the maximum interval of stability for this deer population.

(0, 8000)

2. A population can be modeled by the following discrete dynamical system

$$u(n) = u(n-1) + R \cdot u(n-1)$$

where R is a function of the population u and is shown in the following graph.



- (a) Determine the intrinsic growth rate for this population?

0.2 or 20%

- (b) Find all 3 equilibrium values for this population.

0, 100, 700

- (c) Sketch a rough graph of the population as a function of time, being sure to show each equilibrium value clearly and being sure to show what happens to any initial populations which are above or below each positive equilibrium value.

Graph discussed in class

- (d) Determine the minimum viable population.

100

(e) Find a formula for R as a function of u given that its graph is a parabola.

$$R = \frac{-0.2}{300^2} (u - 400)^2 + 0.2$$

(f) If $u(0) = 200$, then what is the value of $u(10)$?

699.01