

## Homework assigned Monday, April 9.

**Problem 1.** 100 rats jump ship on a small island. Four months later there are 600 rats. Assume the population has continuous exponential growth.

(a) Find the intrinsic growth of the rat population and give the answer with units. *Answer:* .4479 (rats/mon)/rat.

(b) Give a formula for the size of the rat population after  $t$  months. *Answer:*  $P(t) = 100e^{.4479t}$ .

(c) What is the doubling time for the size of the population? *Answer:*  $t = 1.547$  months.

(d) How long until there are 10,000 rats? *Answer:*  $t = 20.56$  months.

**Problem 2.** A tank of tilapia is harvest so that the intrinsic growth rate is  $r = -.3$  (fish/year)/fish. If the tanks is stocked at a continuous rate of 3,000 fish/year, then what is the stable population size? *Answer:* 10,000 tilapia.

**Problem 3.** A tank is used to raise algae for fish food. If the intrinsic growth rate of the algae is  $-.15$  (kg/yr)kg at what rate should the tank be stocked to have a stable mass of algae of size 5,000 kgs? *Answer:*  $S = 750$  kg/yr.