

## §9.4 Models for Population Growth

## In-class Activity 9.4



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## Activity 1:

Prove that the only solutions to the law of natural growth/decay,  $\frac{dP}{dt} = kP$ , are of the form  $P(t) = P_0 e^{kt}$ , where  $P_0 = P(0)$ .

## Activity 2:

We consider the DE:  $\frac{dP}{dt} = 0.3P(4 - P)$

- (a) What is the  $k$  and the carrying capacity  $M$ ?
- (b) What are the general solutions?
- (c) If the initial conditions are  $P(0) = 1$ , predict the population size when  $t = 3$ .

### Activity 3:

A deer population grows logistically with growth constant  $k = 0.4$  (units are  $\text{year}^{-1}$ ) in a forrest with carrying capacity of 1000 deer.

- (a) Find the population of deer after  $t$  years if the initial population is 100 deer.
- (b) How long does it take for the deer population to reach 500?