

## WARMUP—AB Calc Review

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 $3y^2 - 2x^2 = 6 - 2xy$  at the point (3,2)?

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HW Questions

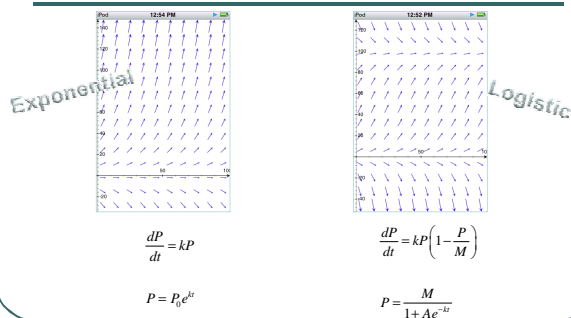
***AP Calculus BC***

Day 6  
Population & Logistic Growth

### Exponential Growth vs. Logistic Growth

	Exponential	Logistical
Differential Equation	$\frac{dP}{dt} = kP$	$\frac{dP}{dt} = kP\left(1 - \frac{P}{M}\right)$
Equation	$P = P_0 e^{kt}$	$P = \frac{M}{1 + Ae^{-kt}}$

### Comparing the Slope Fields



### Solving the differential equation for Logistical Growth

$$\frac{dP}{dt} = kP\left(1 - \frac{P}{M}\right)$$

### Example

$$\frac{dP}{dt} = kP\left(1 - \frac{P}{M}\right)$$

The maximum bear population in a park is 100. The population at  $t = 0$  is 10 (such that  $t$  is measured in years). The constant of proportionality is  $k = 0.1$ .

- Write a differential equation to model the population.
- Solve the differential equation.
- When will the population reach 50?
- How long will it take to reach the carrying capacity? (Assume it has reached capacity when the population is 99.5% of the carrying capacity.)

