AOS Senior AP Calculus BC, Spring 2024  
Major Summative #9 (with Calculator)  
*Differential Equation and Logistic Growth  
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# Logistic and DE Test

## Question Bank v1

### Logistic

1. A population has a growth equation modeled by . What is
2. A population growth model is given by for . If the initial population at is 1200, what is the value of ?
3. A population is modeled by logistic growth. Its population growth rate increases until the population is 512 and then the growth rate begins decreasing. Write a differential model for this population in the form of an equation for . Your final answer *may* include undetermined constants, if that is appropriate.
4. A population is modeled by logistic growth when , with a maximum population of 450 and an initial population of 300. Which of the following could be a graph of for ?
5. A logistic growth model approximates a population’s growth for the year range 1900-2000. If the initial population is 400 and the population after 20 years is 500, write an equation to model the population as a function of , where is “number of years since 1900.”
6. The population of a city at time is increasing according to a logistic differential equation. Which of the following could be the differential equation?

A.

B.

C.

D.

E.

1. The size of a rabbit population is modeled by the function that is a solution to the logistic differential equation , where is measured in years for and the initial population satisfies . Which of the following statements could be true?
   1. The graph of has a point of inflection for .
   2. The maximum rate of change of occurs at .
   3. None
   4. II only
   5. I & II only
   6. II & III only
2. The rate of change of the number of people in a mall is modeled by a logistic differential equation. The maximum number of people allowed in the mall is 2000 . At 10 A.M., the number of people in the mall is 200 and is increasing at a instantaneous rate of 400 people per hour. Which of the following differential equations describe this situation?
3. The function satisfies the logistic differential equation , where . Which of the following statements is false?
   1. has a maximum value when .
   2. when
   3. When

### Diff EQ

1. Which of the following functions is a solution for the differential equation y”+6y=0?
2. Which of the following differential equations given below has the solution ?
3. Solve with initial condition [answer ]
4. Matching : slope fields to DE
5. Given the following slope field for [graphic]
   1. Graph the particular solution through (2,0)
   2. Evaluate if
   3. True or false: if
6. Which of the following could model a population with a maximum population of 400 and a minimum of 200?