

Name _____

1. Given that $\frac{dP}{dt} = \sqrt[3]{P}$ and $P(0) = 100$, use Euler's Method with $\Delta t = 2$ to obtain an estimate for $P(10)$.
2. Suppose that 200 rabbits are released on Lady Tottington's estate, and that the population of these rabbits grows logistically with an intrinsic growth rate of 4% per month and a carrying capacity of 1000 rabbits.
 - (a) Let R represent the number of rabbits on her estate t months after the initial release. Determine a differential equation with initial condition to model this population of rabbits.
 - (b) Sketch a plausible graph for this population of rabbits.
3. The population of a town is currently 600, but is projected to grow by 30 people per year from now on.
 - (a) Determine a differential equation with initial condition to model this town's population. Use P for the population t years from now.
 - (b) Find an explicit formula for this town's population.
4. The population of a town t years from now is given by P . Suppose that the population of the town is currently 400.
 - (a) Determine a mathematical model which best describes this town's population if it grows at a continuous rate of 8.5% per year.
 - (b) Determine a mathematical model which best describes this town's population if it grows at an annual rate of 8.5% per year.
 - (c) Find an explicit formula for P using each of your models above and use it to predict the population 10 years from now.
5. Suppose that the population of a town is always growing at a rate which is proportional to the population itself. Suppose further that the population is currently 500 and is growing at a rate of 25 people per year. Find a differential equation with initial condition to model the population of this town. Use P for the population t years from now.