

## Exponential Growth and Inhibited Growth

- a) The differential equation  $\frac{dy}{dx} = ry$  describes a situation in which a population size  $y$  increases at a rate proportional to its size. Use separation of variables to find a solution to this equation.
- b) The differential equation  $\frac{dy}{dx} = ry(s - y)$  ( $s > 0$ ) describes change in a population which tends toward a fixed size  $s$ . For example, this might describe a population in which food or space is limited. Use separation of variables and the fact that  $\int \frac{dy}{y(s - y)} = \frac{1}{s} \ln \left| \frac{y}{s - y} \right| + c$  to find a solution to this equation.

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