

DECA Chapter I Test

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1. Consider the equation $\frac{dp}{dt} = 0.5p - 450$ that gives the population of a certain species
 - (a) Find the general solution to this equation
 - (b) Solve for the equilibrium solution
 - (c) Solve for the specific solution if there are initially 1000 members in the species
2. Consider the equation $\frac{dy}{dt} = ay - b$
 - (a) Find the general solution
 - (b) Solve the initial value problem for $y(0) = y_0$
3. Consider the equation $\frac{dy}{dt} + 2y = 3$
 - (a) Find the integrating factor, $\mu(t)$
 - (b) Find the general solution
 - (c) State the equilibrium solution
4. Show the solution for the arbitrary equation $\frac{dy}{dt} + ay = g(t)$ in terms of a general integral solution.
5. Solve the initial value problem for $ty' + 2y = 4t^2$ with the value $y(1) = 2$
6. Solve the differential equation $\frac{dy}{dt} - 2y = 4 - t$, find the initial point that separates solutions that grow large positively to large negatively when $t \rightarrow \infty$
7. Given the equation $\frac{dp}{dt} = 0.5p - 450$ that gives the population of a species (t = months)
 - (a) Find the time the population becomes extinct if $p(0) = 850$
 - (b) Find the time of extinction if $p(0) = p_0$ where $0 < p_0 < 900$
 - (c) Find the initial population if the population becomes extinct after 1 year