

MATH 221 (Washington) Review Exam 2 Fall 2008

1. Solve $y' = (2t + 3)y^2$, $y(0) = 4$.
2. Solve the differential equation $y' = t + 2 - y$, $y(0) = 5$.
3. Sketch the graphs of the solutions to the following differential equations:
 - (a) $y' = 30 - 5y$, $y(0) = 0$.
 - (b) $y' = -.03y(4 - y)$, $y(0) = 3$
4. The rate of growth of a certain population is proportional to the difference between the population and the square of the population. Write a differential equation that is satisfied by the population at time t and sketch a typical solution.
5. A hot liquid cools at a rate proportional to the difference between the temperature y of the liquid and the room temperature T . Set up (but do not solve) the differential equation satisfied by the temperature y . State whether the constant of proportionality you use is positive or negative.
6. Consider the differential equation $y' = (y + 1)(y - 4)$. Sketch the solution corresponding to the initial condition $y(0) = 4$ and the solution for $y(0) = 0$.
7. Calculate the following: (a) $.08/.4$ (b) $(2/3)/(1/2)$ (c) $.001 \times .034$
8. Determine the fourth Taylor polynomial of $f(x) = \ln(x)$ at $x = 1$.

The following might be useful:

$$A(t) = \int a(t) dt, \quad y = e^{-A(t)} \left[\int e^{A(t)} b(t) dt + C \right]$$