

Math 1B Discussion Section Problems

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- Find the general solution for each of the following differential equations:
 - $\frac{dy}{dx} = e^x$
 - $y'' = 20x^3 + 2$
 - Solve the initial value problem $y' = e^x$, $y(0) = 3$
 - How many initial conditions do you need in order to solve an initial value problem for part (ii)?
- For each of the following cases, write down a differential equation that expresses the given idea mathematically:
 - A function that equals its derivative
 - A function that equals its second derivative
 - A function that equals the negative of its second derivative.
 - Find a solution to each of your equations in (a)
- For each differential equation, determine if the given function is a solution:
 - $y' = e^x + y$; $y = xe^x$
 - $\frac{dP}{dx} = 1 + P^2$; $P = \tan x$
 - $(y')^2 = 4 + y^2$; $y = e^x - e^{-x}$
 - $f' = \frac{1}{e^f}$; $f = \ln(x + C)$
- Suppose a function $y(t)$ satisfies the differential equation $y' = y^4 - 6y^3 + 5y^2$.
 - What are the constant/equilibrium solutions?
 - When is y increasing?
 - Decreasing?
 - Using your information from (a), (b), and (c) try to vaguely sketch a few solutions to this differential equation.