

DISCUSSION QUESTIONS

- (1) Is the differential equation $y' = y^{2/3}$ ordinary? linear? What is its order?
- (2) Which of the following is a solution to the differential equation $y' = y^{2/3}$:
- (a) $y = 8t^2$
 - (b) $y = e^{2t/3}$
 - (c) $y = \frac{1}{27}t^3$
 - (d) $y = 0$ (constant function 0)
- (3) There is a solution to $xy'' = (4x - 4)y$ of the form $y = xe^{ax}$ for some real number a . Find a .
- (4*) If f, g are solutions to $y^{(3)} + 2e^xy^{(2)} - y = \cos(x)$, show that $\frac{f+g}{2}$ is too.
- (5*) Using only calculus, justify the claim we made earlier that $y = Ce^{ax}$ is the general solution to $y' = ay$ for any $a \in \mathbb{R}$. That is, explain why there aren't any other solutions (exponential or otherwise).

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