

Homework 2

Math 217

Due: 12 September 2018 by 11:00 PM

Instructions: Write your solutions to the following problems and submit them on Crowdmark by the deadline. You are encouraged to work in groups or consult with each other on the problems, but the work submitted must be your own and must be written up by you.

- (1) Draw a slope field for the equation $y' = y(y-6)^4$, and include a couple of sample solution curves. Identify the constant solutions, as well as the possible values for $\lim_{t \rightarrow \infty} y(t)$ (depending on the initial conditions).
- (2) Consider the equation $y' = 3y^{2/3}$ with initial condition $y(0) = 0$.
 - (a) Give at least two different solutions to this equation.
 - (b) Why is this possible? Explain in light of the existence-uniqueness theorem.
 - (c) If we change the initial condition to $y(0) = 1$, is there an interval where we can guarantee a unique solution? Find this interval if it exists.
- (3) Find the general solution to $(\tan x)y' + y = \sin x$.
- (4) Find the solution to $(x^2 + 4)y' + 3xy = x$ with initial condition $y(0) = 1$.