Senior Colloquium: *History of Mathematics*

Math 400 Spring 2020 — Fowler 310 T 1:30pm - 2:55pm

 — http://sites.oxy.edu/ron/math/400/20/

Homework 2

1. (Adapted from **Eves, 12.9, p461-462**) [6 points]

   (a) The differential equation

   $$y^{n-1}\frac{dy}{dx} + a(x)y^n = f(x)$$

   is known as **Bernouilli's Equation**. Show that the transformation $v = y^n$ converts Bernouilli's equation into a linear differential equation,

   (b) The differential equation

   $$y = xy' + f(y')$$

   is known as **Clarault's Equation**. Show that the solution of Clairault's Equation is

   $$y = cx + f(c)$$

   where C is an arbitrary constant.

   (c) The differential equation

   $$\frac{dy}{dx} = p(x)y^2 + q(x)y + r(x))$$

   is known as **Riccati's equation**. Show that if $v = f(x)$ is a particular solution of the differential equation, then the substitution $y = v + 1/z$ converts the Roccati equation into a linear differential equation in z