Ma 2a P: Homework N.1

due Tuesday Oct 12, 12 noon

1. Solve the following differential equations:
   - $ty' + 2y = t^2 - t + 1$, for $t > 0$, with initial condition $y(1) = 1/2$;
   - $y' + \frac{2}{t}y = \frac{\cos(t)}{t^2}$, for $t > 0$, with initial condition $y(\pi) = 0$
   - $xy' = (1 - y^2)^{1/2}$.

2. Brachistochrone problem: #32 p.67.[1]

3. Solve the differential equation
   - $y' + p(t)y = q(t)$ with $y(0) = 0$, where

$$p(t) = \begin{cases} 2 & 0 \le t \le 1 \\ 1 & t > 1 \end{cases}$$

$$q(t) = \begin{cases} 1 & 0 \le t \le 1 \\ 0 & t > 1 \end{cases}$$

4. Bernoulli equations: problem #27 p.77 [2]

[1] numbering according to the 9th edition of the book: if you have a different edition, please check the page and number with the latest edition to make sure you are looking at the right problem.

[2] Same as above.