

Rec Suggestion

(only a suggestion, do what you think is best) Feb 9

1. Do some examples of separable equations:

(a) $y' = -y^2 - 1$; (b) $y' = y^2$, (c) $y' = e^{-y}$, (d) $y' = y^{\frac{1}{2}}$

In some cases discuss where the solution is defined, existence and uniqueness (particularly for the last one).

2. Do one (or maybe 2) examples of integrating factor,

(a) $y' + t \cdot y = t^3$, (b) $y' + \frac{1}{t} y = 1$.

3. What is the most general hypothesis on $p(t), q(t)$ under which $y' + p(t)y = q(t)$ has a solution? Maybe talk about "patching" solution for a piecewise cts. function:

$p(t) = \text{constant}$,

$$q(t) = \begin{cases} 0, t < t_0 & \text{Find solutions for } t < t_0 \text{ \& } t > t_0 \text{ separately, and then match the} \\ 1, t \geq t_0 & \text{limiting values of } y(t). \end{cases}$$

4. How does the order of diff. of $p(t), q(t)$ effect the order of diff. of y ? (in the last example, for instance).

5. Warm-up for lecture: Define Lipschitz and prove a cts. function on a closed, bdd interval is Lipschitz.