MECH 6313-Quiz3 | Jonas Wagner | 2021-03-03

1) $\dot{x} = f(x)$

In order for a solution to exist for a generalized nonlinear system, or at least some sufficient conditions are:

- $f(x)$ continuous on $[0, t_+)$ → exists on $[0, t_+)$
- $f(x)$ Locally Lipshitz Continous (on $[0, t_+)$) → unique solution exist on $[0, t_+)$
- $f(x)$ Globally Lipshitz Continous → unique solution exists on $[0, \infty)$

2) $\dot{x} = -ax^3 = f(x, a)$

$\frac{df}{dx} = -3ax^2$ $\quad \frac{ds}{dt} = -3x^2 s - x^3$

$\frac{df}{da} = -x^3$

The sensitivity to the parameter is increase as the diviation increases quadratically.

3) a) Not Nessicarily, but normally is... must not have asymptotic jumps...

b) True

c) False, must be Piecwise cont.