

HW 4

Problem 1

Show that $x(t)=0$, $t \geq 0$ is an unstable solution of ODE

$$\ddot{x} - x + \dot{x} \sin x = 0$$

Hint 1: Find U and use stronger Criterion of instability.

Hint 2: If $y = \dot{x} \Rightarrow$ look for U in the form of quadratic polynomial in x and y .

Problem 2 Find if $x=y=0$ is a stable or unstable sol of

$$\begin{cases} \dot{x} = y^3 + x^2 y \\ \dot{y} = x^3 - x y^2 \end{cases}$$

Hint: Use V or U for analysis of stability or instability, respectively.