

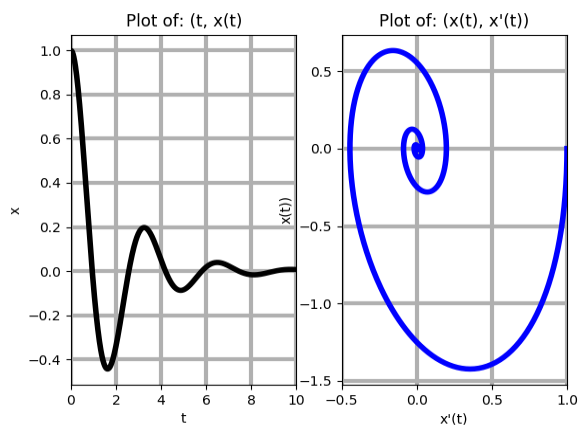
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Student Number : 18998712
Module : TW244 Applied Mathematics
Task : Computer Assignment 05
Due Date : Wednesday-10-10-2018

The Code for the assignment follows after the diagrams. However, the plotting functions will not be attached but can be found in the following github repository:

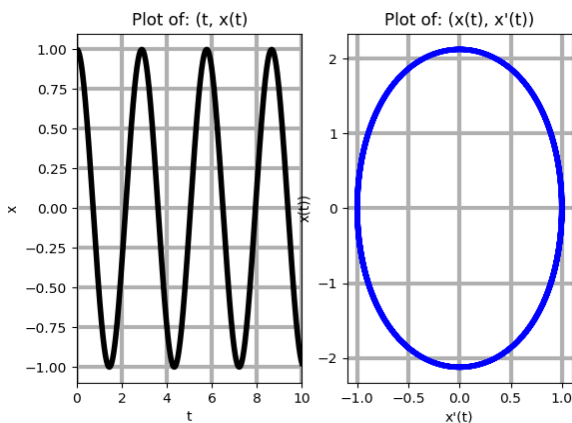
<https://github.com/BhekimpiloNdhlela/TW244AppliedDifferentialEquations.git>

Question 1:

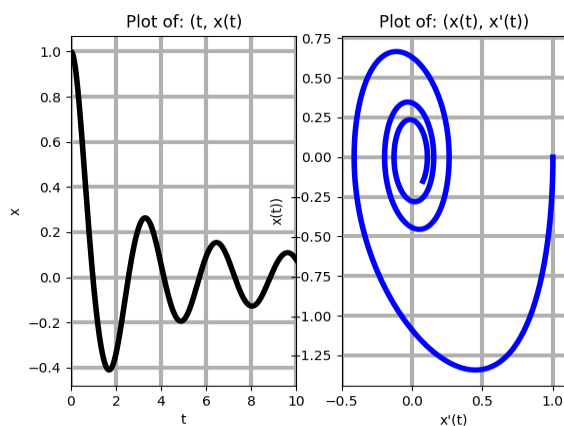
1a.)



1b.)

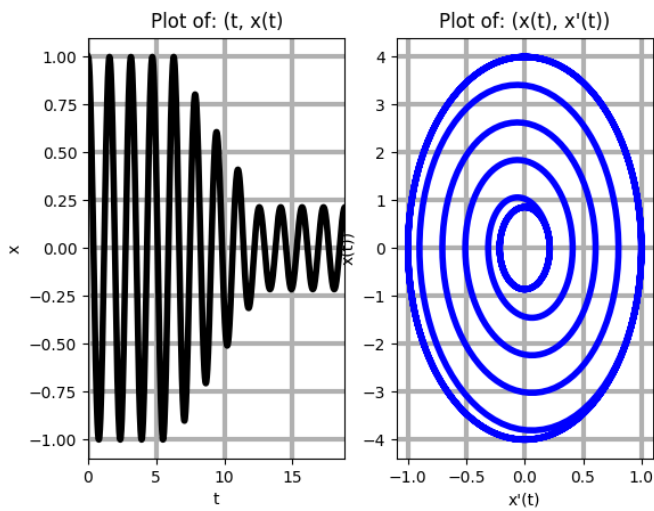


1c.) The reason $(\mathbf{x}')^2$ won't work, is because $|\mathbf{x}'|\mathbf{x}'$ incorporates the direction of motion.

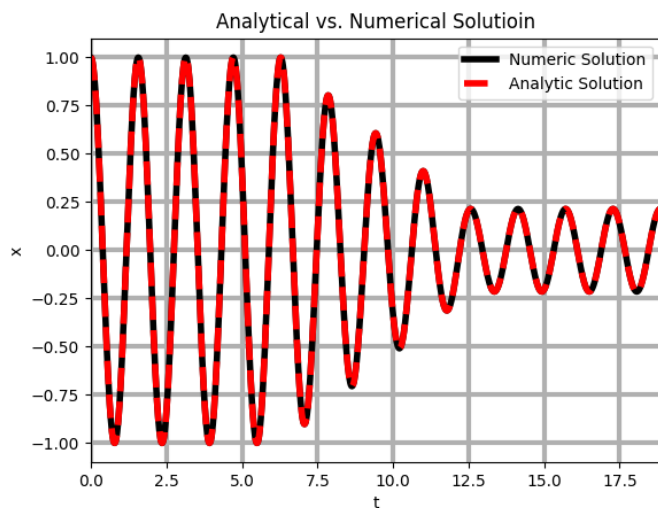


Question 2:

2a.)

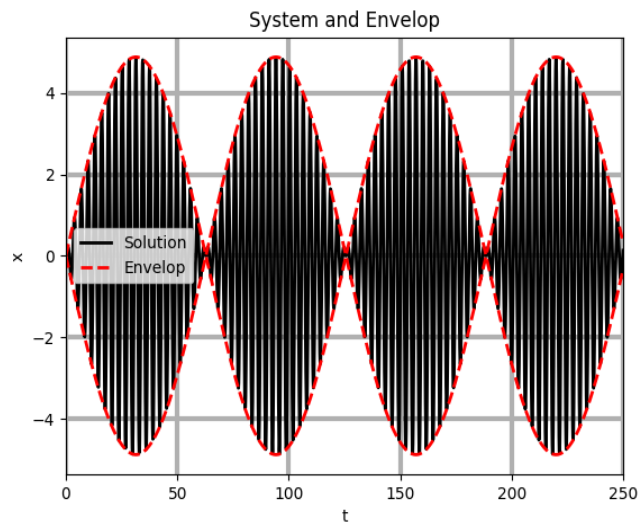


2c.) The **Numerical solution** is accurate enough to match the **Analytical solution** this is depicted by the figure below, hence the figure also confirms that $x(t)$ is the **Analytical solution**.

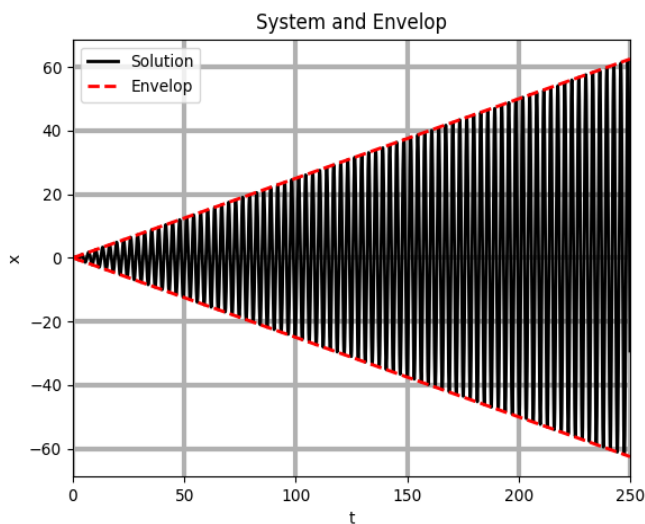


Question 3:

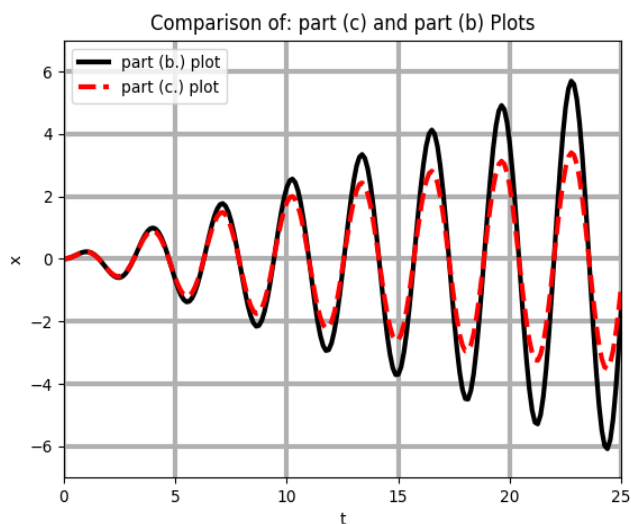
3a.)



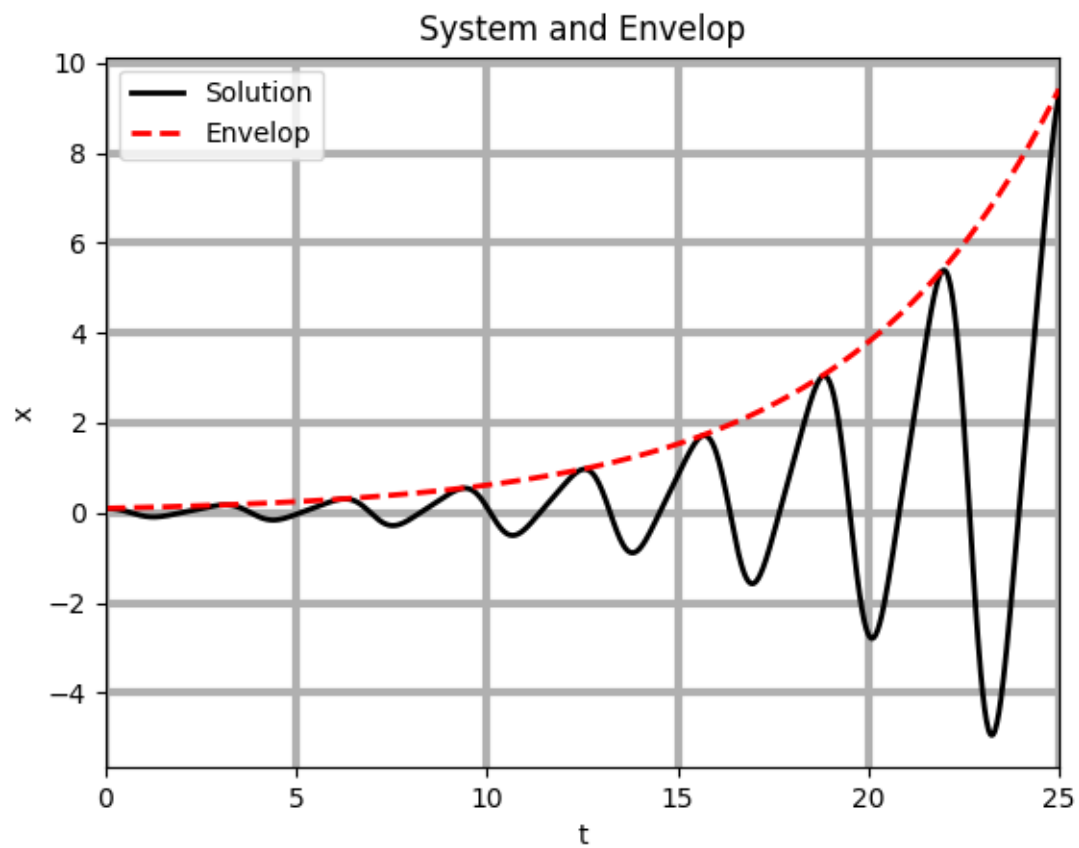
3b.)



3c.) The plot from part (b.) grows quicker than that of part (c.) this is evident because the amplitude of part (b.) is growing more than the one for part (c.) as time increases, this is due to the fact that the introduced term $(-0.1 * x')$ to part (c.)



Question 4:



Remark: The figure above which includes the positive **envelop** confirms that that the **amplitude** of these **oscillations** grow **exponentially**(since the envelop is an exponential function).