**atProblem 1.**

Fill in the following table, specifying the dependent variable, the independent variable(s), the order of the differential equation and whether it is linear or non-linear and explain why. If the system is non-linear, **place a box around the term(s) making it non-linear**. All equations are in terms of a function of an independent variable.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SYSTEM** | **ORDER?** | **Dependent**  **Variable** | **Independent**  **Variable(s)** | **Autonomous or Non-Autonomous?** | **LINEAR OR NON-LINEAR?**  **Circle any term(s) that make it non-linear.** |
| *x*2y'' + xy' + y = cos (x) | 2 | y | *x* | **Non** | **Linear** |
| *y' + ey = x* | 1 | y | x | **Non** | **Nonlinear** |
| = -t2 + et | 2 | y | t | **Non** | **Linear** |
|  | ***3*** | x | *t* | *Non* | *Nonlinear* |
|  | ***2*** | *i* | *t* | *Non* | *Linear* |

**Problem 2 (Separation of Variables)**

Find the IVP solution for the following differential equation by separation of variables:



