**5.** [12 points] Each of the following requires a short (one equation or formula) answer. Provide the required answer, and a short (one or two sentence) explanation.

    a. [3 points] Write a linear, constant coefficient, second order, nonhomogeneous differential equation for which the method of undetermined coefficients is not applicable.

    b. [3 points] Write a linear, constant coefficient, second order differential equation that has the phase portrait shown to the right.
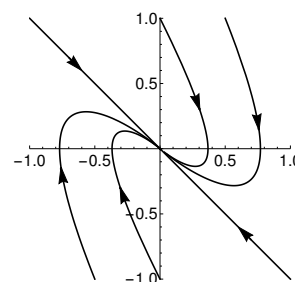
    c. [3 points] If $L[y] = f(t)$ is a linear, constant coefficient, second order differential equation and $L[y] = 0$ is solved by $y = c_1 e^{-t} + c_2 t e^{-t}$, write a function $f(t)$ for which a good solution guess would be $y = At^3 e^{-t} + Bt^2 e^{-t}$.

    d. [3 points] Write a linear, constant coefficient, second order differential equation having a phase portrait that is a spiral sink converging on the point $(2, 0)$.