

Problem 7.18. Proceed as follows.

- a. The system has only one equilibrium point  $(0, 0)$ . Show that linearization gives no information about the stability of  $(0, 0)$ .
- b. Find a (possibly strict) Lyapunov function for the system at  $(0, 0)$ .
- c. Using the result of part b, what can be said about the stability of  $(0, 0)$ ?
- d. Sketch the phase portrait of the system. Highlight the orbit starting at  $(1, 2)$ . What happens to this orbit as  $t \rightarrow \infty$ ?