HW8 (due Nov. 14th)

Instructions. You *must* declare all resources that you have used on this homework (include but not limited to anyone, any book, and any webpage). Do not skip steps.

Problem 2-5 are to determine the stability of certain solutions, where you may directly apply the stability theorem proved in class, and no need to reprove the theorem.

1. [B-N] Consider $\frac{dy}{dt} = f(y)$ and y_0 is an equilibrium solution of this equation. State the definition of "y_0 is **unstable**" using $\varepsilon - \delta$ language.
2. [B-N] Page 151 Problem 9 (c,d,e,f).
3. [B-N] Page 154 Problem 4.
4. [B-N] Page 154 Problem 6.
5. [B-N] Page 154 Problem 10.
6. [B-N] Page 158 Problem 15.
7. [B-N] Page 159 Problem 17. (Hint: Solve the differential equation.)
8. State the analogue of the stability theorem for the system

$$\frac{dy}{dt} = A(t)y,$$

where $A(t)$ is a continuous function of period T. (using Floquet/Characteristic multiplier), namely,

a) If _____, zero solution is asymptotically stable;
b) If _____, zero solution is stable;
c) If there exists at least one multiplier with modulus bigger than 1, then the zero solution is unstable.