Homework 11

Math 469 (section 500), Spring 2019

This homework is due on Thursday, April 5

0. Read Sections 4.7–4.8

1. Use the Routh-Hurwitz criterion to find conditions on $b \in \mathbb{R}$ so that all solutions of the following differential equation approach zero:

$$\frac{d^3x}{dt^3} + b\frac{d^2x}{dt^2} + \frac{dx}{dt} + 2x = 0 .$$

2. Find conditions on $\alpha \in \mathbb{R}$ and $\beta \in \mathbb{R}$ so that all solutions of the following differential equation approach zero:

$$\frac{d^2x}{dt^2} = \alpha\frac{dx}{dt} + \beta x .$$

3. Find a general solution to the following differential equation, where $c > 0$ and $d > 0$:

$$\frac{dB}{dt} = d - cB .$$

   Find the equilibria and their stability. (How) Does your answer depend on c and d?

4. Section 4.12 #13–15

5. (This part of your homework pertains to your final project.) *This week, you will critique another student's draft. Staple your comments to the draft, and make sure both your name and the authors' names appear on the front. Do not staple this to the rest of your homework.*

   (a) Read through the draft. Mark each spot you got confused.

   (b) What questions do you have for the authors?

   (c) Is each of the three required sections (introduction, background, results) adequate?

   (d) What aspects of the draft did you like?

   (e) What could the authors do to improve their draft?