Assignment 5

The purpose of this assignment is to improve your understanding of control systems and their application in real-life scenarios. You will be evaluating the performance of different control systems under various conditions.

1. Consider a control system with the following transfer function:
   \[ G(s) = \frac{1}{s^2 + 4s + 5} \]
   a. Determine the type of the system and its order.
   b. Find the poles of the system.
   c. Sketch the root locus for the system.
   d. Determine the stability of the system.

2. A control system has the transfer function:
   \[ G(s) = \frac{1}{s^3 + 2s^2 + 3s + 2} \]
   a. Determine if the system is stable.
   b. Find the poles of the system.
   c. Sketch the root locus for the system.
   d. Determine the stability of the system.

3. The transfer function of a control system is given by:
   \[ G(s) = \frac{1}{s^4 + 2s^3 + 3s^2 + 4s + 5} \]
   a. Determine if the system is stable.
   b. Find the poles of the system.
   c. Sketch the root locus for the system.
   d. Determine the stability of the system.

4. A control system has a transfer function of the form:
   \[ G(s) = \frac{1}{s^5 + 2s^4 + 3s^3 + 4s^2 + 5s + 6} \]
   a. Determine if the system is stable.
   b. Find the poles of the system.
   c. Sketch the root locus for the system.
   d. Determine the stability of the system.

5. Which of the following statements about the system is true?
   a. The system is unstable.
   b. The system is stable.
   c. The system's stability cannot be determined from the given information.

6. Which of the following control systems is more suitable for a given application?
   a. A system with a higher order of stability.
   b. A system with a lower order of stability.
   c. A system with a middle order of stability.

7. Consider a control system with a transfer function:
   \[ G(s) = \frac{1}{s^2 + 2s + 1} \]
   a. Determine the type of the system and its order.
   b. Find the poles of the system.
   c. Sketch the root locus for the system.
   d. Determine the stability of the system.

8. A control system has the transfer function:
   \[ G(s) = \frac{1}{s^3 + 2s^2 + 3s + 1} \]
   a. Determine if the system is stable.
   b. Find the poles of the system.
   c. Sketch the root locus for the system.
   d. Determine the stability of the system.