TTK4150 Nonlinear Control Systems
Department of Engineering Cybernetics
Norwegian University of Science and Technology
Fall 2015 - Assignment 4
Due date: Thursday 29 October at 11.00.

1. Exercise 4.54 in Khalil.
   Hint: If a system is ISS, then:

   (a) for $u(t) \equiv 0$ the origin is globally asymptotically stable.

   (b) for a bounded input $u(t)$, every solution $x(t)$ is bounded.

   If one of these is not satisfied, the system can **not** be ISS.

2. Exercise 4.55 no. (1), (2), (4) and (5) in Khalil.
   Hint for part (2): Read example 4.27 before doing this exercise.
   Hint for part (4): For $u(t) \equiv 0$ an ISS system needs to have a globally asymptotically stable origin. This requires the absence of other equilibria.

3. Exercise 4.56 in Khalil.

4. Exercise 5.3 in Khalil.

5. Exercise 5.4 in Khalil.

6. Exercise 5.20 in Khalil.

7. Exercise 9.12 in Khalil.

8. Exercise 9.13 in Khalil.

9. Exercise 10.9 no. (1) and (2) in Khalil.

10. Exercise 10.10 no. (1) and (2) in Khalil.