Department of Engineering Cybernetics

TTK4215 Adaptive Control
Assignment 3

Problem 1

Problem 4.5 in Ioannou & Sun.

Hint: Formulate linear parametric models $z = \theta^{*^T}\phi$. z and ϕ can only contain known signals. Some filtering might be needed..

Problem 2

Problem 4.6 in Ioannou & Sun.

Hint: Since $\phi \neq 0$, we can pre-multiply each side of an equation with ϕ^T. Remember that dot products produce a scalar which can be "moved through" vector expressions.

Problem 3

Problem 4.7 in Ioannou & Sun.

Hint: Use the definition of PE given on page 177.

Problem 4

Problem 4.4 in Ioannou & Sun.

Hint: See section 4.3.4. The difference from the example in the book is that when WL is biproper (degree of numerator equals that of the denominator), the realization (A,B,C,d) of (4.3.29) will include a non-zero value for d.

To get a negative semidefinite derivative of the Lyapunov function ($\dot{V} \leq 0$), completing the squares can be a useful trick to handle indefinite terms.