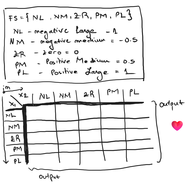
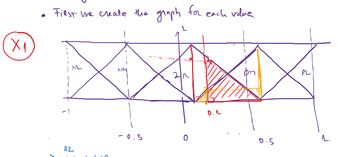
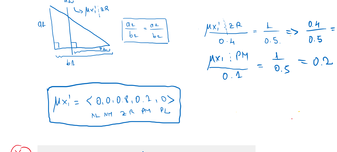
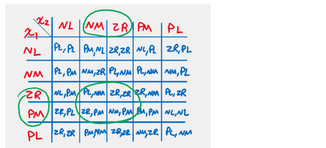
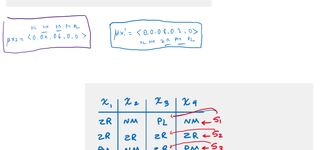
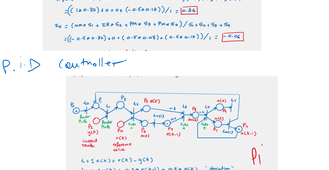


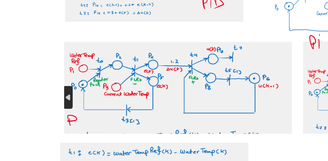


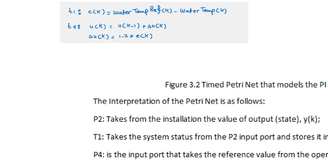


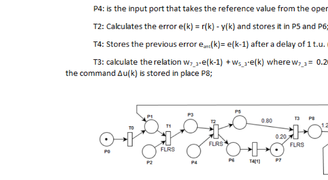












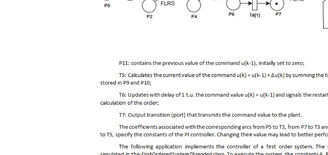


Figure 3.2 Timed Petri Net that models the PI controller

The Interpretation of the Petri Net is as follows:

P2: Takes from the installation the value of output (state), y(k);

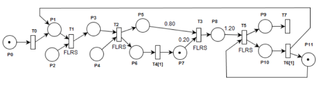
T1: Takes the system status from the P2 input port and stores it in the place P3;

P4: is the input port that takes the reference value from the operator, r(k);

T2: Calculates the error e(k) = r(k) - y(k) and stores it in P5 and P6;

T4: Stores the previous error e_{ant}(k)= e(k-1) after a delay of 1 t.u. (time unit) at place P7;

T3: calculate the relation w_{2_1}·e(k-1) + w_{1_1}·e(k) where w_{2_1} = 0.20 and w_{1_1} = 0.80. Deviation of the command Δu(k) is stored in place P8;



P11: contains the previous value of the command u(k-1), initially set to zero;

T5: Calculates the current value of the command u(k) = u(k-1) + Δu(k) by summing the two values stored in P8 and P10;

T6: Updates with delay of 1 t.u. the command value u(k) = u(k-1) and signals the restart of a new calculation of the order;

T7: Output transition (port) that transmits the command value to the plant.

The coefficients associated with the corresponding arcs from P5 to T3, from P7 to T3 and from P8 to T5, specify the constants of the PI controller. Changing their value may lead to better performance.

The following application implements the controller of a first order system. The system is simulated in the *FirstOrderedSystem Threaded* class. To execute the system, the constants A, B, C, D are specified in the *StateSpace* representation and the period.