

11.4 task (20 min)

Fuzzy Controller: IF input T is *cold* THEN output u is *large*
 IF input T is *hot* THEN output u is *small*

Sketch the input-output characteristic curve $u = f(T)$ for the following fuzzy sets. Mark the points u_i and T_i

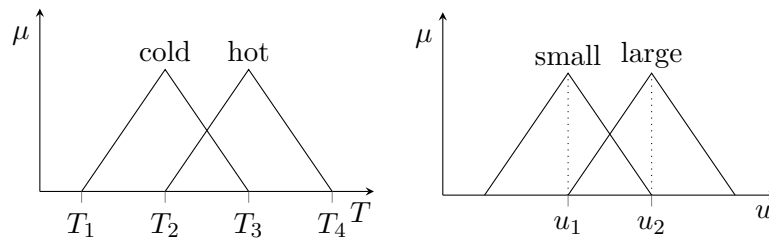
a)

Figure 48: Fuzzy sets

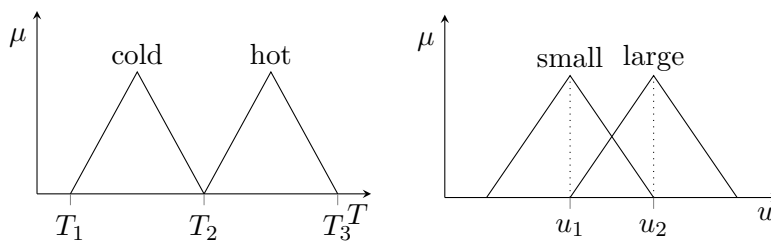
b)

Figure 49: Fuzzy sets

c)

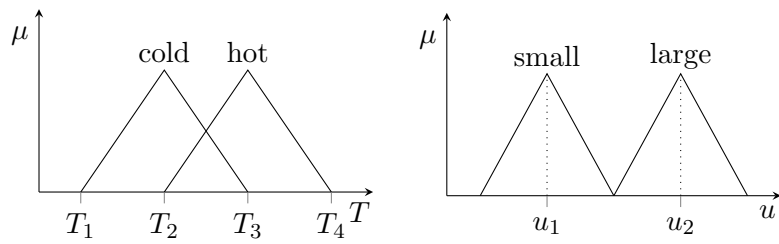


Figure 50: Fuzzy sets

d)

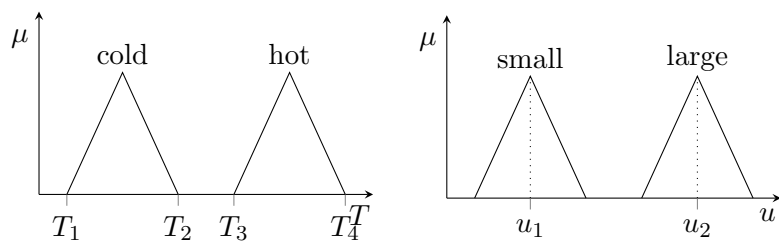


Figure 51: Fuzzy sets

e)

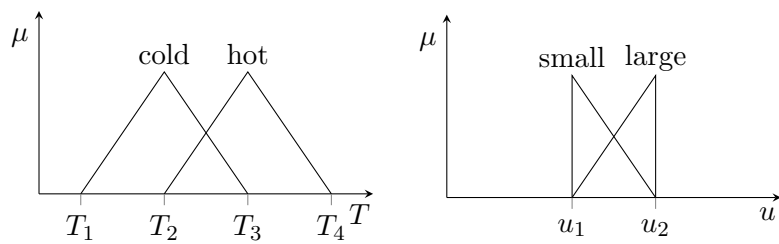


Figure 52: Fuzzy sets

f)

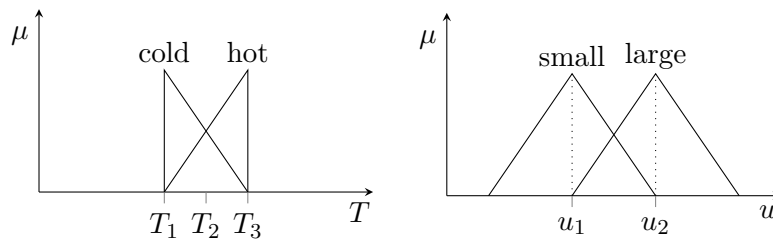


Figure 53: Fuzzy sets

Solution: a)

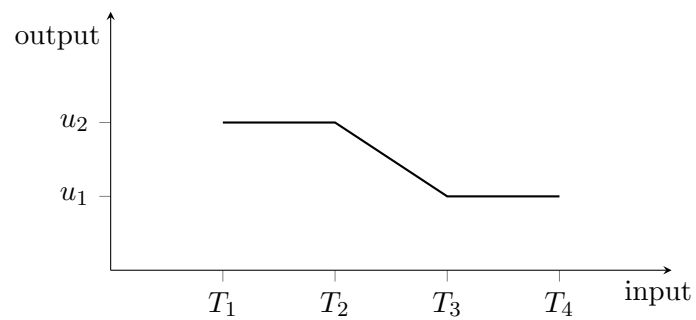


Figure 54: input-output characteristic part a)

Solution: b)

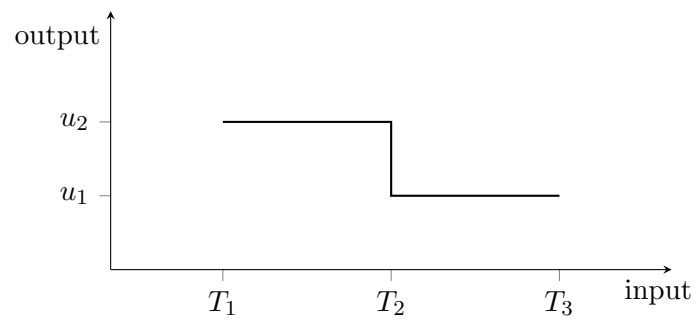


Figure 55: input-output characteristic part b)

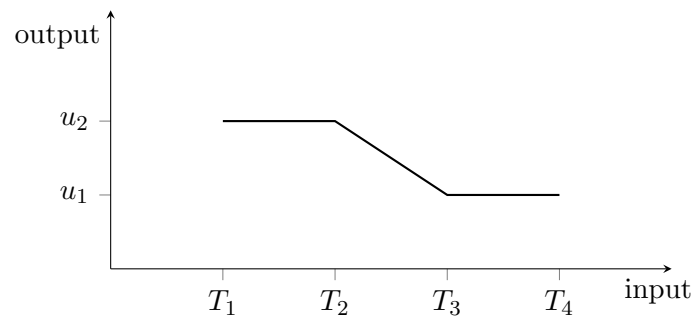
Solution: c)

Figure 56: input-output characteristic part c)

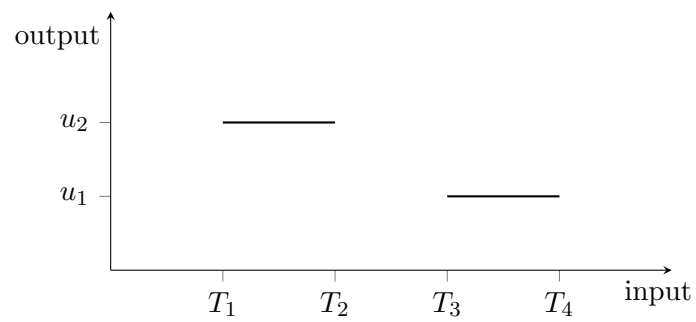
Solution: d)

Figure 57: input-output characteristic part d)

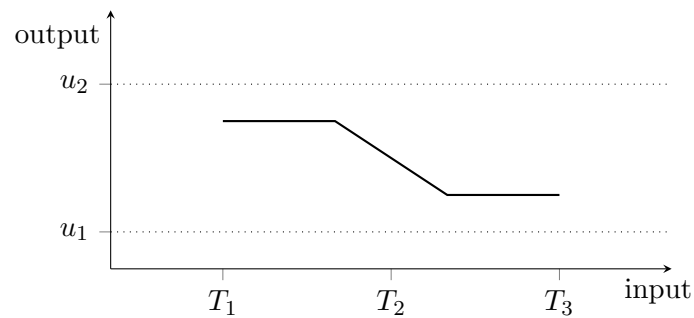
Solution: e)

Figure 58: input-output characteristic part e)

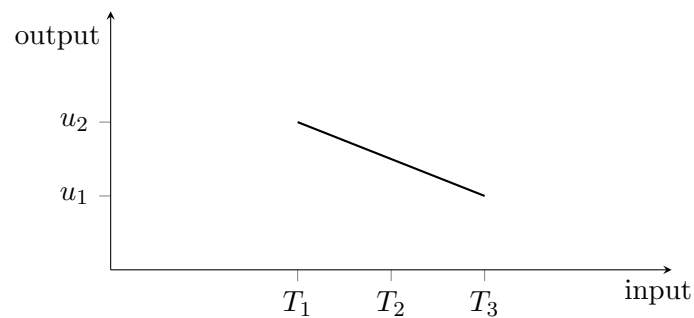
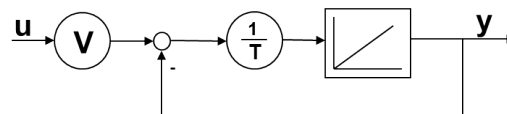
Solution: f)

Figure 59: input-output characteristic part f)

11.5 task (20 min)*Discrete Transfer Element*

A continuous first-order lag is given by the block diagram shown above.

- a) The integrator can be approximated by a discrete sum. Write the discrete difference equation of this system.