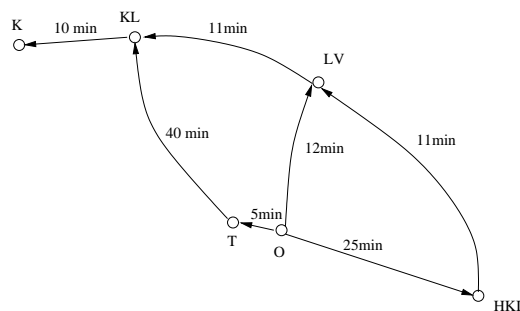


## Agenttipohjaisen tietojenkäsittelyn perusteet

## Laskuharjoitus 5

## Tehtävät



1.

A rational engineer wants to travel from Otaniemi to Kirkkonummi using public transportations. There are three possible routes:

- I) First take a bus to downtown Helsinki (ticket 15 mk) and then from there to Kirkkonummi by train (24 mk).
- II) Take a bus to Leppävaara (10 mk) and from there to Kirkkonummi by train (16 mk)
- III) Take a bus to Tapiola, change to another bus and go to Kauklahti (10 mk) and board a train from there (10 mk).

The durations of the travel routes are shown in the above figure.

- a) Let the engineer have a cost function  $U(t, m) = m + at$ , where  $m$  is the cost,  $t$  is the duration of trip, and  $a$  his hourly rate. What route should the engineer take so that  $U(t, m)$  is minimized, when  $a = 40\text{mk/h}$ . What should the hourly rate be so that route III would be better than the route II? Is one of the routes clearly better or worse than the others.
- b) Let cost function  $U(t_1, t_2, m) = a_1t_1 + a_2t_2 + m$ , where  $t_1$  is the time spent in a bus,  $t_2$  the time spent in a train,  $a_1 = 1.5a$  and  $a_2 = 0.5a$ . What is now the best route?
- c) Let  $U(t)$  be as in a-part, but the busses may be late according to the following probability distribution:

Line	0 min	1 min	5 min	10 min	15 min
O-Hki	75%	20%	5%	-	-
O-T	80%	15%	5%	-	-
T-KL	20%	20%	20%	20%	20%
O-LV	30%	20%	-	20%	30%

What choice is now the best?