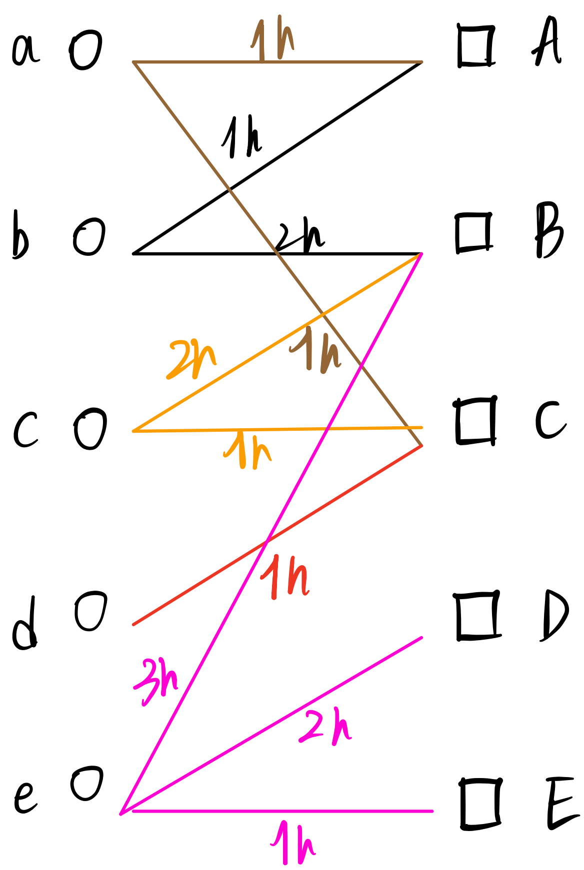

1. Is there a solution that satisfies all customers

2. Which one is the best
$\sum t_i \to \min$?

1. No, since for city D, E, customers can only get from car e, so they can't get at the same time.

2.

car \ city	A	B	C	D	E
a	1h		1h		
b	1h	2h			
c		2h	1h		
d			1h		
e		3h		2h	1h

Mentioned in Q1

For D, E the best way is to go to E first then come back to e then to D

$t_1 = 2 \times 1 + 2 = 4h$

(If car serves only one, then no D, $t_1 = 1h$)

e is occupied so the rest table is

city / car	A	B	C
a	1h		1h
b	1h	2h	
c		2h	1h
d			1h

(For each car, round trip won't be profitable since

$\min(t_i) \times 2 + \min(t_i) > X \qquad i = a, b, c, d$

$\forall X \in t_i, X \neq \min(t_i)$)

Since for city A、B、C. Dilivery time is the same for every city. So it doesn't matter allocate which car to it.

$t_2 = 1+2+1 = 4h$

$t_{min} = t_1 + t_2 = 8h$ (or $5h$ as mentioned)

As for possible combination:

aA	aA	aC
bB	bB	bA
cC	dC	cB

eE
Ee
eD

Algorithm:

car \ city	A	B	C	D	E
a	1h		1h		
b	1h	2h			
c		2h	1h		
d			1h		
e		3h		2h	1h

Greedy Algorithm (No round trip)

For cities X, car Y;

$$N(Y_X) = 1 \Rightarrow X_{onepath}$$

For $X_{onepath}$, car Y:

$$Y_{X_{onepath_i}} = Y_{X_{onepath_j}}$$

$$T_1 = \min T(Y_{X_{onepath}}) \Rightarrow X_{allocated}, Y_{allocated}$$

For cities $X_{unallocated}$, car $Y_{unallocated}$:

$$T = \min T(Y_X)$$

$$T = \sum(\min T(Y)) + T_1$$