

## Question 1

1 the shortest-time route: RABRCR, RBARCR, RCRABR, RCRBAR. They need 16 mins.

1b Usually, I will draw the flowchart and calculate the time of all the scenarios by hand. And then I would pick up the maximum value.

It is clear that the delivery staff must start from R and terminal at R, and they must pass A,B and C during the delivery. Also the R could not be put together. There are mainly 24 situations.

RABCR 17

--INSERT one R into this sequence

RARBCR 19

RABRCR 16

--INSERT two R into this sequence

RARCRBR 18

RBACR 18

--INSERT one R into this sequence

RBRACR 20

RBARCR 16

--INSERT two R into this sequence

RBRARCR 18

RBCAR 21

--INSERT one R into this sequence

RBRCAR 20

RBCRAR 19

--INSERT two R into this sequence

RBRCRAR 18

RCABR 18

--INSERT one R into this sequence

RCRABR 16

RCARBR 20

--INSERT two R into this sequence

RCRARBR 18

RCBAR 17

--INSERT one R into this sequence

RCRBAR 16

RCBRAR 19

--INSERT two R into this sequence

RCRBRAR 18

Therefore we need to use python to identify the distance between each node to calculate the 24 situations, which is called a decision/node tree after searching on the Internet.

## Question 2

1. The shortest distance is 14 mins and the route is RABCR, RCBAR

2. my calculation procedure

RABCR 14

--INSERT one R into this sequence

RARBCR 17

RABRCR 17

--INSERT two R into this sequence

RARCRBR 20

RBACR 17

--INSERT one R into this sequence

RBRACR 20

RBARCR 17

--INSERT two R into this sequence

RBRARCR 20

RBCAR 17

--INSERT one R into this sequence

RBRCAR 20

RBCRAR 17

--INSERT two R into this sequence

RBRCRAR 20

RCABR 17

--INSERT one R into this sequence

RCRABR 17

RCARBR 20

--INSERT two R into this sequence

RCRARBR 20

RCBAR 14

--INSERT one R into this sequence

RCRBAR 17

RCBRAR 17

--INSERT two R into this sequence

RCRBRAR 20

Question 3

$ab = v$

$ac = w$

$ar = y$

$bc = x$

$cr = z$

$br = u$

//

situation 1 =  $(ar + br + cr) * 2$

find the highest of  $ac+br$ ,  $ab+cr$ ,  $bc+ar$ , and this amount = x

situation 2 =  $(ar + br + cr) + x$

find the lowest value of  $ac+br$ ,  $ab+cr$ ,  $bc+ar$ , and this amount = x

situation 3 =  $(ar+br+cr+ab+ac+bc)-x$

//

compare the 3 values calculated in situation 1, situation 2 and situation 3.