Task: Q01ATNW

Introduction

In this task you are given a program that contains a few syntactical mistakes.Your task is to spot and report these mistakes.

Task

□ Line 1	□ Line 2	□ Line 3	□ Line 4
□ Line 5	□ Line 6	□ Line 7	□ Line 8
□ Line 9	□ Line 10	□ Line 11	□ Line 12
□ Line 13	□ Line 14	□ Line 15	□ Line 16
□ Line 17	□ Line 18		

```
1   model q1nw
2   products
3      stuff ("quantity") 1.0
4   functions
5      calculate roadFunction  4 * length + 4
6      durationFunction highwayFunction  2 * length + 2
7   network
8      nodes
9         n0 at (5, 1)
10        n1 locatedAt (10, 9)
11        n2 at (12, 1)
12     edges
13        group beltway function highwayFunction members
14           b1 from n0 to n1
15           from n0 to n2
16        group road  function roadFunction members
17           r1 starts at node n1 ends at node n2
18           r2 from n2 to n1
```

Correct solution

☑Line 3, ☑Line 5, ☑Line 10, ☑Line 15, ☑Line 17

Evaluation 2020

Parameter	Value	Parameter	Value
Answer Cell	Yes	NegPointsP	5 (default)
CorAnswersString	Yes	WrongAnswAllowed	0 (default)
Points	5	MissingAnswAllowed	2
WrgAnswersString	No (default)	MaxPointsToGet	10 (default)

Evaluation 2021

Parameter	Value	Parameter	Value
Answer Cell	Yes	NegPointsP	5 (default)
CorAnswersString	Yes	WrongAnswAllowed	0 (default)
Points	5	MissingAnswAllowed	0 (default)
WrgAnswersString	No (default)	MaxPointsToGet	10 (default)

Task: Q01ATAG

Introduction

In this task you are given a program that contains a few syntactical mistakes.Your task is to spot and report these mistakes.

Task

☐ Line 1	☐ Line 2	☐ Line 3	☐ Line 4
☐ Line 5	☐ Line 6	☐ Line 7	☐ Line 8
☐ Line 9	☐ Line 10		

```
1   agentTypes
2     agentType delivery1 maxWeight 360
3       behaviour awt awaitTourExternal when finished do die
4       behaviour die disappear
5     agentType delivery   2 maxWeight 360
6       behaviour awt awaitTourExternal when finished do die
7       behaviour die vanish
8     agent delivery3 maxWeight 360
9       behaviour awt awaitTourExternal when finished do "die"
10      behaviour die vanish
```

Correct solution

☑ Line 4, ☑ Line 5,☑ Line 8, ☑ Line 9

Evaluation 2020, 2021

Parameter	Value	Parameter	Value
Answer Cell	Yes	NegPointsP	5 (default)
CorAnswersString	Yes	WrongAnswAllowed	0 (default)
Points	5	MissingAnswAllowed	0 (default)
WrgAnswersString	No (default)	MaxPointsToGet	10 (default)

Task: Q02ATAG (1/2)

Introduction

In this task you will find a program with a gap. Additionally, you are presented four code snippets that can be used to fill the gap. However, some of these snippets do not make sense (either for themselves or in the completed program). It is your task to find the nonsensical snippets and report them.

Task

Below you see a VRPTW modelled with Athos. In line 35, the definition of a depot is required. Which of the proposed snippets given at the bottom of this page are semantically incorrect (in other words: which of the four snippets do not make complete sense)?

□ Snippet 1 | □ Snippet 2 | □ Snippet 3 | □ Snippet 4

```
1   model newModel
2     products
3       stuff weight 30.0
4     functions
5       durationFunction roadFunction length + cfactor
6     network
7       nodes
8         n0 (1.0, 1.0)
9         n1 (1.0, 8.0)    hasDemand stuff units 30.0
10        n2 (2.0, 11.0)   hasDemand stuff units 30.0
11        n3 (4.0, 6.0)
12        n4 (5.0, 12.0)   hasDemand stuff units 30.0
13        n5 (8.0, 11.0)   hasDemand stuff units 30.0
14        n6 (8.0, 7.0)    hasDemand stuff units 30.0
15        n7 (13.0, 12.0)
16        n8 (9.0, 5.0)
17        n9 (13.0, 1.0)
18      edges
19        group lcfgroup cfactor 2.0 function roadFunction  members
20          el01 from n0 to n1
21          el02 from n1 to n2
22          el03 from n2 to n4
23          el04 from n4 to n5
24          el05 from n6 to n5
25          el06 from n7 to n4
26          el07 from n7 to n9
27          el08 from n9 to n0
28          el09 from n9 to n8
29          el10 from n8 to n6
30          el11 from n5 to n7
31        group hcfgroup cfactor 4.0 function roadFunction members
32          eh01 from n5 to n3
33          eh02 from n3 to n0
34      sources
35        // code to be added
36    agentTypes
37      agentType myDeliveryType congestionFactor 0 maxWeight 180
38        behaviour awt awaitTour when finished do die
39        behaviour die vanish
```

Task: Q02ATAG (2/2)

Task (continuation)

Snippet1:

```
35 n1 isDepot stuff sprouts myDeliveryType customers n0, n2, n4, n5, n6 at 0
```

Snippet 2:

```
35 n0 isDepot stuff sprouts myDeliveryType customers n0, n2, n4, n5, n6 at 0
```

Snippet 3:

```
35 n0 isDepot stuff sprouts myDeliveryType customers n1, n2, n3, n5, n6 at 0
```

Snippet 4:

```
35 n0 isDepot stuff sprouts myDeliveryType customers n1, n2, n4, n5, n6 at 0
```

Correct solution

☑ Snippet 1, ☑ Snippet 2, ☑ Snippet 3

Evaluation 2020, 2021

Parameter	Value	Parameter	Value
Answer Cell	Yes	NegPointsP	5 (default)
CorAnswersString	Yes	WrongAnswAllowed	0 (default)
Points	5	MissingAnswAllowed	0 (default)
WrgAnswersString	No (default)	MaxPointsToGet	10 (default)

Task: Q03ATALL (1/4)

Introduction

In this task you see the illustration of a Network (comprised of customers, demands, roads / highways etc.). In addition, the illustration also shows optised vehicle routes for a VRP based on the illustrated network.Your task is to determine which of the three models / programs corresponds to the illustrated network.
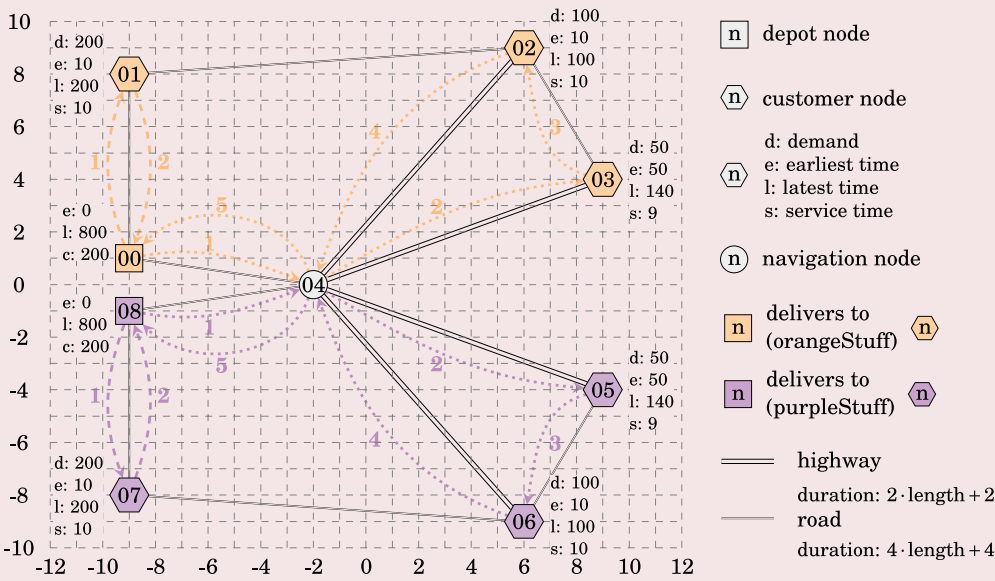
Task

Q1 – Which of the three programs corresponds to the illustration?

○Program 1	○Program 2	○Program 3

Task: Q03ATALL (2/4)

Task (continuation)

Program 1

```
1   model q11AllStartState
2   products
3     orngStuff weight 1.0
4     prplStuff weight 1.0
5   functions
6     durationFunction roadFunction  4 * length + 4
7     durationFunction highwayFunction  2 * length + 2
8   network
9     nodes
10      n0 at (-9, 1) isDepot orngStuff sprouts orngVehis customers n1, n2, n3 at 0 latestTime 800
11      n1 at (-9, 8) hasDemand orngStuff units 200 earliestTime 10 latestTime 200 serviceTime 10
12      n2 at (6, 9) hasDemand orngStuff units 100 earliestTime 10 latestTime 100 serviceTime 10
13      n3 at (9, 4) hasDemand orngStuff units 50 earliestTime 50 latestTime 140 serviceTime 9
14      n4 at (-2, 0)
15      n5 at (9, -4) hasDemand prplStuff units 50 earliestTime 50 latestTime 140 serviceTime 9
16      n6 at (6, -9) hasDemand prplStuff units 100 earliestTime 10 latestTime 100 serviceTime 10
17      n7 at (-9, -8) hasDemand prplStuff units 200 earliestTime 10 latestTime 200 serviceTime 10
18      n8 at (-9, -1) isDepot prplStuff sprouts prplVehis customers n7, n6, n5 at 0 latestTime 800
19    edges
20      group roadGroup function roadFunction members
21        h1 from n2 to n4
22        h2 from n3 to n4
23        h3 from n6 to n4
24        h4 from n5 to n4
25      group highwayGroup function highwayFunction members
26        r1 from n0 to n1
27        r2 from n0 to n4
28        r3 from n1 to n2
29        r4 from n2 to n3
30        r5 from n8 to n7
31        r6 from n8 to n4
32        r7 from n7 to n6
33        r8 from n5 to n6
34  agentTypes
35    agentType orngVehis congestionFactor 0 maxWeight 200
36      behaviour awt awaitTour when finished do die
37      behaviour die vanish
38    agentType prplVehis congestionFactor 0 maxWeight 200
39      behaviour awt awaitTour when finished do die
40      behaviour die vanish
```

Task: Q03ATALL (3/4)

Task (continuation)

Program 2

```
1  model q11AllStartState
2  products
3    orngStuff weight 1.0
4    prplStuff weight 1.0
5  functions
6    durationFunction roadFunction  4 * length + 4
7    durationFunction highwayFunction  2 * length + 2
8  network
9    nodes
10     n0 at (-9, 1) isDepot orngStuff sprouts orngVehis customers n1, n2, n3 at 0 latestTime 800
11     n1 at (-9, 8) hasDemand orngStuff units 200 earliestTime 10 latestTime 200 serviceTime 10
12     n2 at (6, 9) hasDemand orngStuff units 100 earliestTime 10 latestTime 100 serviceTime 10
13     n3 at (9, 4) hasDemand orngStuff units 50 earliestTime 50 latestTime 140 serviceTime 9
14     n4 at (-2, 0)
15     n5 at (9, -4) hasDemand prplStuff units 50 earliestTime 50 latestTime 140 serviceTime 9
16     n6 at (6, -9) hasDemand prplStuff units 100 earliestTime 10 latestTime 100 serviceTime 10
17     n7 at (-9, -8) hasDemand prplStuff units 200 earliestTime 10 latestTime 200 serviceTime 10
18     n8 at (-9, -1)isDepot prplStuff sprouts prplVehis customers n7, n6, n5 at 0 latestTime 800
19   edges
20     group roadGroup function roadFunction members
21       r1 from n0 to n1
22       r2 from n0 to n4
23       r3 from n1 to n2
24       r4 from n2 to n3
25       r5 from n8 to n7
26       r6 from n8 to n4
27       r7 from n7 to n6
28       r8 from n5 to n6
29     group highwayGroup function highwayFunction members
30       h1 from n2 to n4
31       h2 from n3 to n4
32       h3 from n6 to n4
33       h4 from n5 to n4
34 agentTypes
35   agentType orngVehis congestionFactor 0 maxWeight 200
36     behaviour awt awaitTour when finished do die
37     behaviour die vanish
38   agentType prplVehis congestionFactor 0 maxWeight 200
39     behaviour awt awaitTour when finished do die
40     behaviour die vanish
```

Task: Q03ATALL (4/4)

Task (continuation)

Program 2

```
1  model q11AllStartState
2  products
3    orngStuff weight 1.0
4    prplStuff weight 1.0
5  functions
6    durationFunction roadFunction  4 * length + 4
7    durationFunction highwayFunction  2 * length + 2
8  network
9    nodes
10     n0 at (-9, 1) isDepot prplStuff sprouts prplVehis customers n7, n6, n5 at 0 latestTime 800
11     n1 at (-9, 8) hasDemand orngStuff units 200 earliestTime 10 latestTime 200 serviceTime 10
12     n2 at (6, 9) hasDemand orngStuff units 100 earliestTime 10 latestTime 100 serviceTime 10
13     n3 at (9, 4) hasDemand orngStuff units 50 earliestTime 50 latestTime 140 serviceTime 9
14     n4 at (-2, 0)
15     n5 at (9, -4) hasDemand prplStuff units 50 earliestTime 50 latestTime 140 serviceTime 9
16     n6 at (6, -9) hasDemand prplStuff units 100 earliestTime 10 latestTime 100 serviceTime 10
17     n7 at (-9, -8) hasDemand prplStuff units 200 earliestTime 10 latestTime 200 serviceTime 10
18     n8 at (-9, -1) isDepot orngStuff sprouts orngVehis customers n1, n2, n3 at 0 latestTime 800
19   edges
20     group roadGroup function roadFunction members
21       r1 from n0 to n1
22       r2 from n0 to n4
23       r3 from n1 to n2
24       r4 from n2 to n3
25       r5 from n8 to n7
26       r6 from n8 to n4
27       r7 from n7 to n6
28       r8 from n5 to n6
29     group highwayGroup function highwayFunction members
30       h1 from n2 to n4
31       h2 from n3 to n4
32       h3 from n6 to n4
33       h4 from n5 to n4
34  agentTypes
35    agentType orngVehis congestionFactor 0 maxWeight 200
36      behaviour awt awaitTour when finished do die
37      behaviour die vanish
38    agentType prplVehis congestionFactor 0 maxWeight 200
39      behaviour awt awaitTour when finished do die
40      behaviour die vanish
```

Correct solution

◉ Program 2

Evaluation 2020, 2021

Parameter	Value	Parameter	Value
Answer Cell	Yes	NegPointsP	10
CorAnswersString	Yes	WrongAnswAllowed	0 (default)
Points	10	MissingAnswAllowed	0 (default)
WrgAnswersString	No (default)	MaxPointsToGet	10 (default)

Task: Q04ATNW (1/3)

Introduction

In this task you are shown a program and four different graphical networks. One of these networks is exactly described (modelled) by the program. For the other three networks the program is not completely right. It is your task to find and report the exactly modelled network.

Task

Which of the above networks results from the given Athos model?

○Network A	○Network B	○Network C	○Network D

```
1   model q04atnw
2   products
3     stuff weight 1.0
4   functions
5     durationFunction highwayFunction  1.5 * length
6     durationFunction roadFunction  4 * length + 5
7   network
8     nodes
9       n0 at (0, -6) isDepot stuff sprouts vhcls customers n1, n2, n3, n5, n6 at 0 latestTime 500
10      n1 at (-9, 4) hasDemand stuff units 15 earliestTime 15 latestTime 120 serviceTime 5
11      n2 at (7, -9) hasDemand stuff units 20 earliestTime 10 latestTime 130 serviceTime 7
12      n3 at (8, 5)  hasDemand stuff units 50 earliestTime 20 latestTime 90  serviceTime 10
13      n4 at (2, 0)
14      n5 at (-2, -1) hasDemand stuff units 25 earliestTime 90 latestTime 250 serviceTime 10
15      n6 at (-8, -6) hasDemand stuff units 25 earliestTime 90 latestTime 270 serviceTime 5
16    edges
17      group roadGroup function roadFunction members
18        road1 from n0 to n5
19        road2 from n0 to n4
20        road3 from n5 to n4
21        road4 from n4 to n3
22        road5 from n5 to n1
23        road6 from n0 to n6
24      group highwayGroup function roadFunction members
25        highway1 from n1 to n3
26        highway2 from n3 to n2
27        highway3 from n2 to n6
28        highway4 from n6 to n1
29  agentTypes
30    agentType vhcls congestionFactor 0 maxWeight 180
31      behaviour awt awaitTour when finished do die
32      behaviour die vanish
```
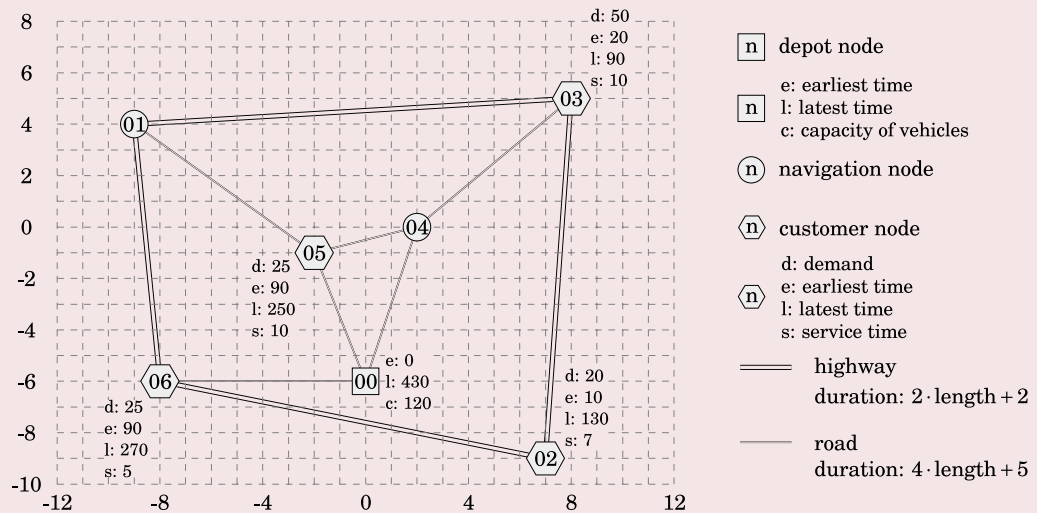
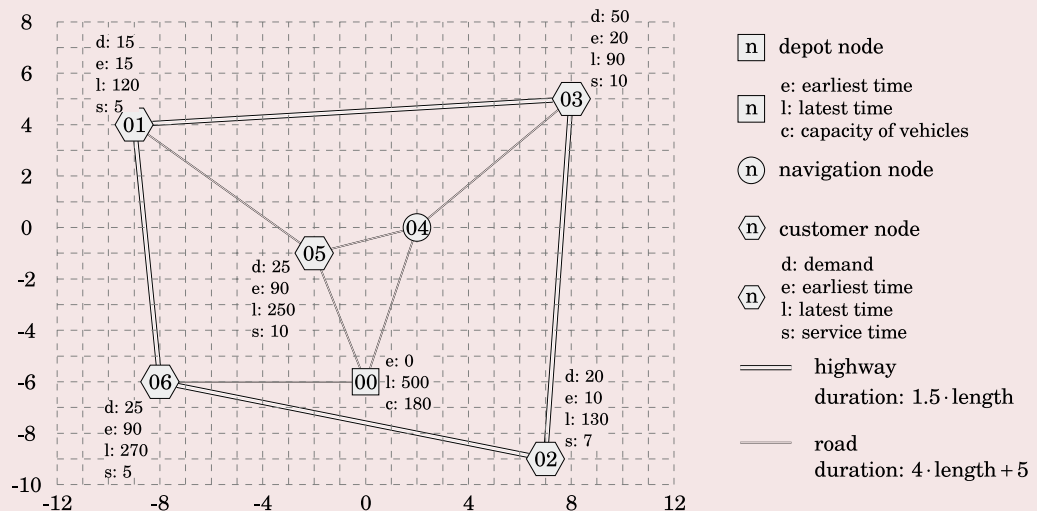## Task: Q04ATNW (2/3)

Introduction

In this task you are shown a program and four different graphical networks. One of these networks is exactly described (modelled) by the program. For the other three networks the program is not completely right. It is your task to find and report the exactly modelled network.
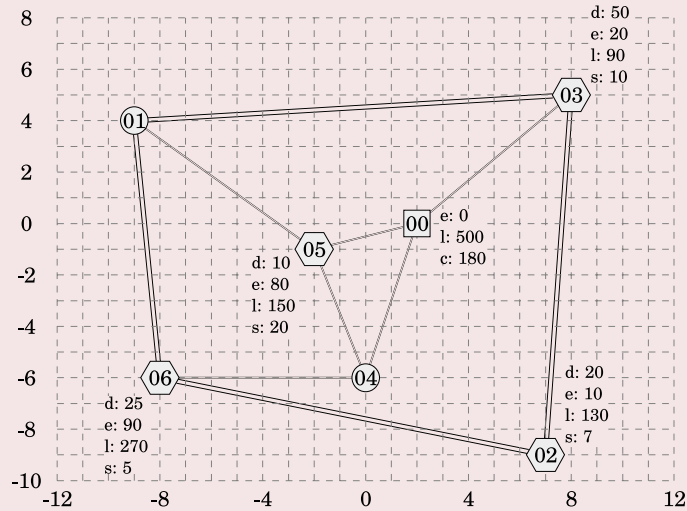
Task (continuation)

Network A
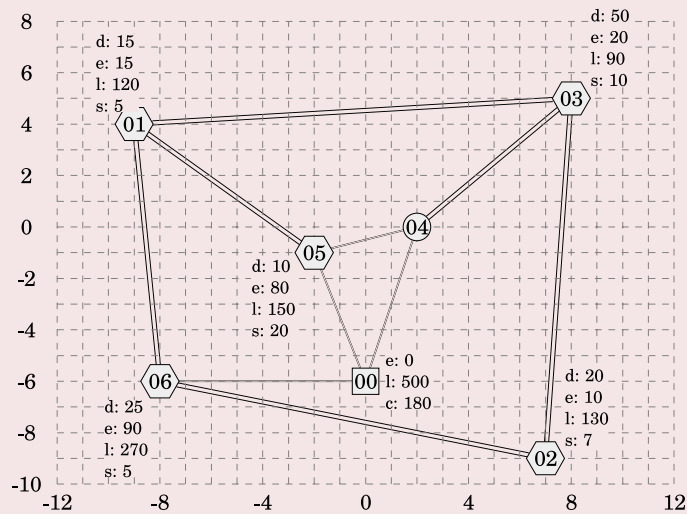

Network B

Task: Q04ATNW (3/3)

Task (continuation)

Network C

Network D

Correct solution

◉ Network B

Evaluation 2020, 2021

Parameter	Value	Parameter	Value
Answer Cell	Yes	NegPointsP	10
CorAnswersString	Yes	WrongAnswAllowed	0 (default)
Points	10	MissingAnswAllowed	0 (default)
WrgAnswersString	No (default)	MaxPointsToGet	10 (default)

Task: Q04ATAG (1/3)

Introduction

In this task you are shown a program and four graphical networks on which four different tours are depicted. One of these networks shows a tour that is exactly described (modelled) by the program. For the other three tours the program is not completely right. It is your task to find and report the exactly modelled tour.

NOTE: If a tour step connects two nodes that do not share an edge, this means that the actual path from the start node to the target node of the respective step is not important. However, only nodes of the drawn tour are serviced!

Task

Which of the presented tours for a vehicle may result from the program given below?

◯Tour 1	◯Tour 2	◯Tour 3	◯Tour 4

```
1  functions
2    durationFunction highwayFunction  length
3    durationFunction roadFunction  3 * length + 5
4  network
5    nodes
6      n0 at (-10, -8) isDepot stuff sprouts vehicles customers n2, n3, n5, n6 at 0 latestTime 500
7      n1 at (-8, -4)
8      n2 at (-11, 2) hasDemand stuff units 20 earliestTime 10 latestTime 130 serviceTime 7
9      n3 at (-5, 4)  hasDemand stuff units 50 earliestTime 20 latestTime 90  serviceTime 10
10     n4 at (-8, 7)
11     n5 at (2, 0) hasDemand stuff units 25 earliestTime 90 latestTime 250 serviceTime 10
12     n6 at (2, 7) hasDemand stuff units 25 earliestTime 90 latestTime 250 serviceTime 10
13     n7 at (6, 5)
14     n8 at (11, 3)
15     n9 at (2, -8)
16     n10 at (8, -6)
17     n11 at (6, -9)
18   edges
19     group roadGroup function roadFunction members
20       road1 from n0 to n1
21       road2 from n2 to n4
22       road3 from n2 to n3
23       road4 from n4 to n3
24       road5 from n3 to n6
25       road6 from n6 to n7
26       road7 from n7 to n8
27       road8 from n8 to n10
28       road9 from n10 to n11
29       road10 from n11 to n9
30     group highwayGroup function highwayFunction members
31       highway1 from n1 to n2
32       highway2 from n1 to n3
33       highway3 from n1 to n5
34       highway4 from n5 to n6
35       highway5 from n5 to n7
36       highway6 from n5 to n10
37       highway7 from n5 to n9
38       highway8 from n9 to n0
39  agentTypes
40    agentType vehicles maxWeight 180
41      behaviour awt awaitTour when finished do die
42      behaviour die vanish
```
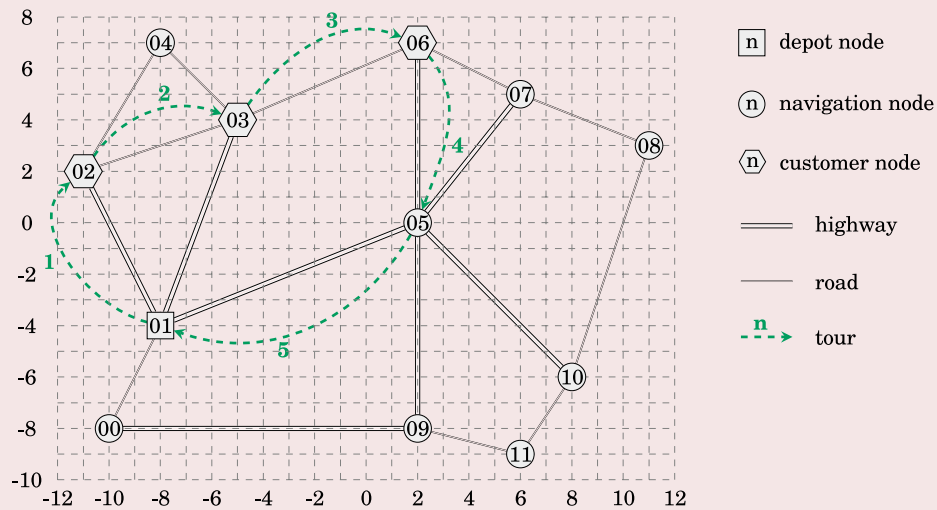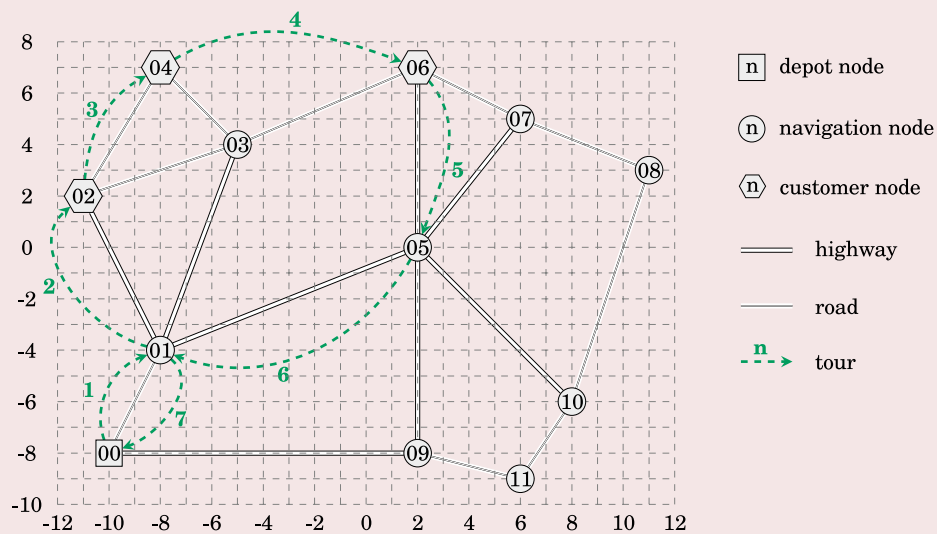
Task: Q04ATAG (2/3)
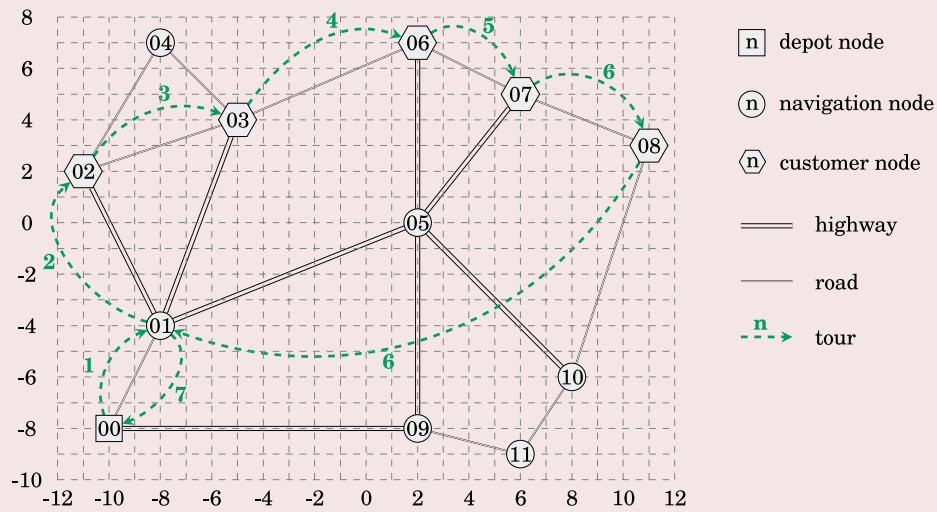
Introduction

Task (continuation)

Tour 1

Tour 2

Task: Q04ATAG (3/3)

Introduction

Task (continuation)

Tour 3

Tour 4
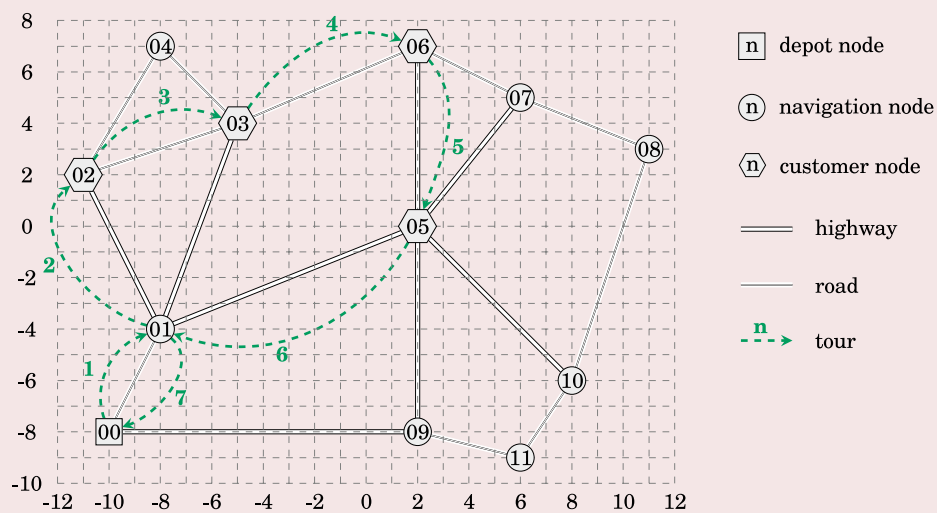
Correct solution

☑ Tour 4

Evaluation 2020, 2021

Parameter	Value	Parameter	Value
Answer Cell	Yes	NegPointsP	10
CorAnswersString	Yes	WrongAnswAllowed	0 (default)
Points	10	MissingAnswAllowed	0 (default)
WrgAnswersString	No (default)	MaxPointsToGet	10 (default)

Task: Q05ATNW (1/2)

Introduction

In this task you will find a program and two networks. The first of the two networks is described by the program. If some of the lines of the program are changed, the program is a description of the second network. It is your task to find these lines and report them.

Task

The Athos model below represents network 1 . What lines of the Athos model would have to be changed if you wanted to model network 2 (multiple answers possible)?

| ☐ Line 1	☐ Line 2	☐ Line 3	☐ Line 4	☐ Line 5	☐ Line 6
☐ Line 7	☐ Line 8	☐ Line 9	☐ Line 10	☐ Line 11	☐ Line 12
☐ Line 13	☐ Line 14	☐ Line 15	☐ Line 16	☐ Line 17	☐ Line 18
☐ Line 19	☐ Line 20	☐ Line 21	☐ Line 22	☐ Line 23	☐ Line 24
☐ Line 25	☐ Line 26	☐ Line 27	☐ Line 28	☐ Line 29	☐ Line 30
☐ Line 31	☐ Line 32	☐ Line 33	☐ Line 34	☐ Line 35	☐ Line 36

```
1   model q5nw
2     products stuff weight 1.0
3     functions
4       durationFunction roadFunction  4 * length + 5
5       durationFunction highwayFunction  1.5 * length + 2
6     network
7       nodes
8         n0 at (-2, -2) isDepot stuff sprouts vehicles customers n2, n3, n4, n6 at 0 latestTime 500
9         n1 at (-8, -4)
10        n2 at (-8, -1) hasDemand stuff units 20 earliestTime 10 latestTime 130 serviceTime 7
11        n3 at (-5,  4) hasDemand stuff units 50 earliestTime 20 latestTime 90  serviceTime 10
12        n4 at (-2, -6) hasDemand stuff units 25 earliestTime 90 latestTime 250 serviceTime 10
13        n5 at (2,  0)
14        n6 at (4,  5) hasDemand stuff units 25 earliestTime 90 latestTime 250 serviceTime 10
15      edges
16        group roadGroup function roadFunction
17          members
18            road1 from n0 to n4
19            road2 from n0 to n5
20            road3 from n0 to n1
21            road4 from n0 to n3
22            road5 from n4 to n5
23        group highwayGroup function highwayFunction
24          members
25            highway1 from n1 to n2
26            highway2 from n2 to n3
27            highway3 from n3 to n6
28            highway4 from n6 to n5
```

Task: Q05ATNW (2/2)

Task (continuation)

Network 1 (currently modelled)
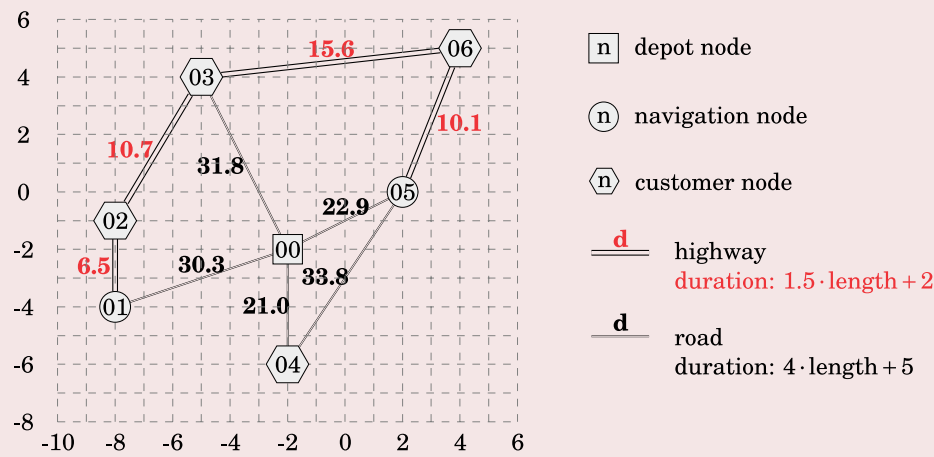
Network 2 (target state)
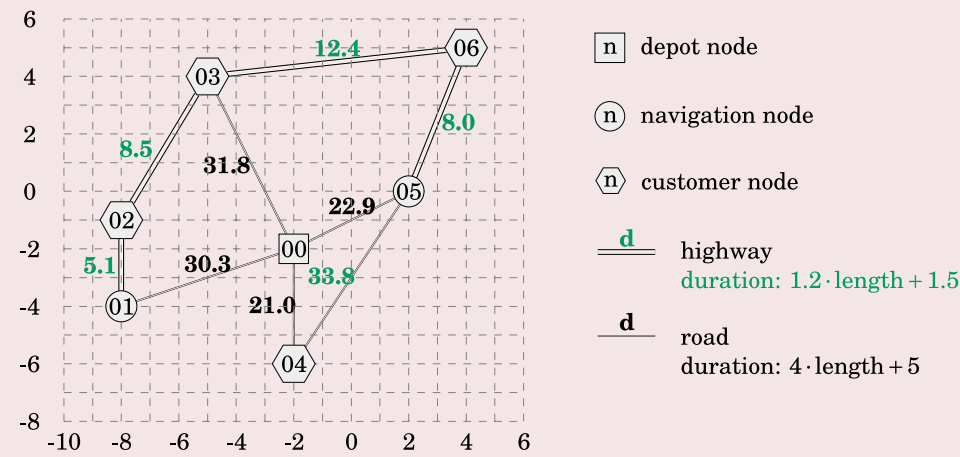
Correct solution

☑ Line 5

Evaluation 2020, 2021

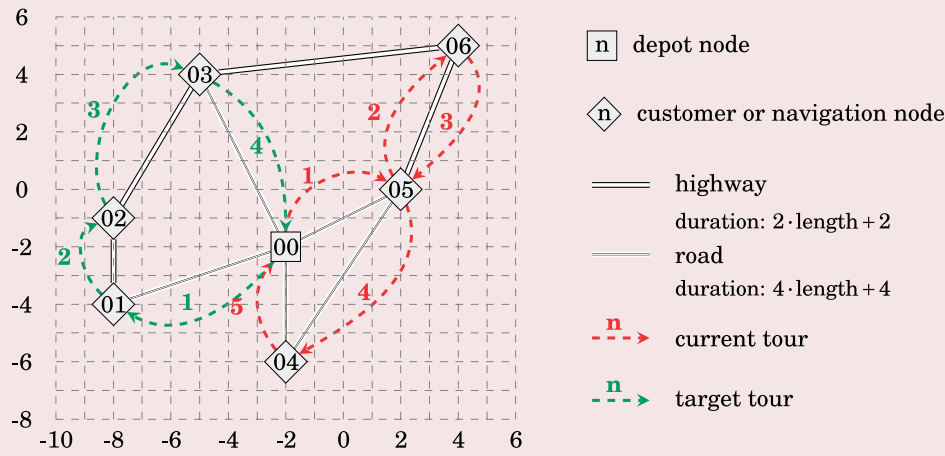| Parameter	Value	Parameter	Value
Answer Cell	Yes	NegPointsP	10
CorAnswersString	Yes	WrongAnswAllowed	0 (default)
Points	10	MissingAnswAllowed	0 (default)
WrgAnswersString	No (default)	MaxPointsToGet	10 (default)

Task: Q05ATAG (1/2)

Introduction

In this task, you will find the graphical representation of a network together with a program. The network shows two tours. The program describes the network and a problem for which one of the tours is likely to be optimal. By changing some lines of the program, the program describes a problem for which the other tour is likely to be optimal. It is your task to find and report these lines.

Task

In the picture below, the red tour is a likely result from the problem modelled in the Athos code given at the bottom. What lines of the Athos model have to be changed so that the green tour is likely to result from the model?

□ Line 1	□ Line 2	□ Line 3	□ Line 4	□ Line 5	□ Line 6
□ Line 7	□ Line 8	□ Line 9	□ Line 10	□ Line 11	□ Line 12
□ Line 13	□ Line 14	□ Line 15	□ Line 16	□ Line 17	□ Line 18
□ Line 19	□ Line 20	□ Line 21	□ Line 22	□ Line 23	□ Line 24
□ Line 25	□ Line 26	□ Line 27	□ Line 28	□ Line 29	□ Line 30
□ Line 31					

Task: Q05ATAG (2/2)

Task (continuation)

```
1  model q5ag
2    products
3      stuff weight 1.0
4    functions
5      durationFunction roadFunction   4 * length + 4
6      durationFunction highwayFunction  2 * length + 2
7    network
8      nodes
9        n0 at (-2, -2) isDepot stuff sprouts vehicles customers n4, n5, n6 at 0 latestTime 20000
10       n1 at (-8, -4) hasDemand stuff units 20 earliestTime 0 latestTime 20000 serviceTime 7
11       n2 at (-8, -1) hasDemand stuff units 20 earliestTime 0 latestTime 20000 serviceTime 7
12       n3 at (-5,  4) hasDemand stuff units 50 earliestTime 0 latestTime 20000  serviceTime 10
13       n4 at (-2, -6) hasDemand stuff units 25 earliestTime 0 latestTime 20000 serviceTime 10
14       n5 at (2,  0) hasDemand stuff units 25 earliestTime 0 latestTime 20000 serviceTime 10
15       n6 at (4,  5) hasDemand stuff units 25 earliestTime 0 latestTime 20000 serviceTime 10
16     edges
17       group roadGroup function roadFunction members
18         road1 from n0 to n4
19         road2 from n0 to n5
20         road3 from n0 to n1
21         road4 from n0 to n3
22         road5 from n4 to n5
23       group highwayGroup function highwayFunction members
24         highway1 from n1 to n2
25         highway2 from n2 to n3
26         highway3 from n3 to n6
27         highway4 from n6 to n5
28   agentTypes
29     agentType vehicles congestionFactor 0 maxWeight 180
30       behaviour awt awaitTour when finished do die
31       behaviour die vanish
```

Correct solution

☑ Line 9

Evaluation 2020, 2021

Parameter	Value	Parameter	Value
Answer Cell	Yes	NegPointsP	10
CorAnswersString	Yes	WrongAnswAllowed	0 (default)
Points	10	MissingAnswAllowed	0 (default)
WrgAnswersString	No (default)	MaxPointsToGet	10 (default)

Task: Q06ATNW (1/4)

Introduction

In this task, you see a program that describes a network for a VRPTW. In addition, you see four more programs. Some of these programs describe the exact same network as the first program, even though they syntactically deviate from the first program. It is your task to find and report these equivalent programs.

Task

Look at the "Program to match" below. One or more of the four possible matches produce an equivalent network. Tick the respective boxes!

☐ Possible match 01	☐ Possible match 02	☐ Possible match 03	☐ Possible match 04

Program to match

```
1  functions
2    durationFunction roadFunction  2 * length + 4
3    durationFunction highwayFunction  4 * length + 2
4    durationFunction specialFunction 3 * length + 3
5  network
6    nodes
7      n0 at (-2, -2)
8      n1 at (-8, -4)
9      n2 at (-8, -1)
10     n3 at (-5,  4)
11     n4 at (-2, -6)
12     n5 at (2,  0)
13     n6 at (4,  5)
14   edges
15     group roadGroup function roadFunction members
16       road1 from n0 to n4
17       road2 from n0 to n5 function specialFunction
18       road3 from n0 to n1
19       road4 from n0 to n3
20       road5 from n4 to n5
21     group highwayGroup function highwayFunction members
22       highway1 from n1 to n2
23       highway2 from n2 to n3
24       highway3 from n3 to n6 function specialFunction
25       highway4 from n6 to n5
```

Task: Q06ATNW (2/4)

Task (continuation)

Matching option 1

```
1  functions
2    durationFunction roadFunction  2 * length + 4
3    durationFunction highwayFunction  4 * length + 2
4    durationFunction specialFunction 3 * length + 3
5  network
6    nodes
7      n0 at (-2, -2)
8      n1 at (-8, -4)
9      n2 at (-8, -1)
10     n3 at (-5,  4)
11     n4 at (-2, -6)
12     n5 at (2,  0)
13     n6 at (4,  5)
14   edges
15     group roadGroup function roadFunction members
16       road1 from n0 to n4
17       road2 from n0 to n5
18       road3 from n0 to n1
19       road4 from n0 to n3
20       road5 from n4 to n5 function specialFunction
21     group highwayGroup function highwayFunction members
22       highway1 from n1 to n2
23       highway2 from n2 to n3 function specialFunction
24       highway3 from n3 to n6
25       highway4 from n6 to n5
```

Matching option 2

```
1  functions
2    durationFunction roadFunction  2 * length + 4
3    durationFunction highwayFunction  4 * length + 2
4    durationFunction specialFunction 3 * length + 3
5  network
6    nodes
7      n0 at (-2, -2)
8      n1 at (-8, -4)
9      n2 at (-8, -1)
10     n3 at (-5,  4)
11     n4 at (-2, -6)
12     n5 at (2,  0)
13     n6 at (4,  5)
14   edges
15     group roadGroup function roadFunction members
16       road1 from n0 to n4
17       road3 from n0 to n1
18       road4 from n0 to n3
19       road5 from n4 to n5
20     group highwayGroup function highwayFunction members
21       highway1 from n1 to n2
22       highway2 from n2 to n3
23       highway4 from n6 to n5
24     group fastwayGroup function specialFunction members
25       fastway1 from n0 to n5
26       fastway2 from n3 to n6
```

Task: Q06ATNW (3/4)

Task (continuation)

Matching option 3

```
 1  functions
 2    durationFunction roadFunction  2 * length + 4
 3    durationFunction highwayFunction  4 * length + 2
 4    durationFunction specialFunction 3 * length + 3
 5  network
 6    nodes
 7      n0 at (-2, -2)
 8      n1 at (-8, -4)
 9      n2 at (-8, -1)
10      n3 at (-5,  4)
11      n4 at (-2, -6)
12      n5 at (2,  0)
13      n6 at (4,  5)
14    edges
15      group roadGroup function roadFunction members
16        road1 from n0 to n4
17        road3 from n0 to n1
18        road4 from n0 to n3
19        road5 from n4 to n5
20      group highwayGroup function highwayFunction members
21        highway1 from n1 to n2
22        highway3 from n3 to n6
23        highway4 from n6 to n5
24      group fastwayGroup function specialFunction members
25        fastway2 from n0 to n5   function highwayFunction
26        fastway1 from n2 to n3 function specialFunction
```

Matching option 4

```
 1  functions
 2    durationFunction roadFunction  2 * length + 4
 3    durationFunction highwayFunction  4 * length + 2
 4    durationFunction specialFunction 3 * length + 3
 5  network
 6    nodes
 7      n0 at (-2, -2)
 8      n1 at (-8, -4)
 9      n2 at (-8, -1)
10      n3 at (-5,  4)
11      n4 at (-2, -6)
12      n5 at (2,  0)
13      n6 at (4,  5)
14    edges
15      road1 from n0 to n4 function roadFunction
16      road2 from n0 to n5  function specialFunction
17      road3 from n0 to n1 function roadFunction
18      road4 from n0 to n3 function roadFunction
19      road5 from n4 to n5 function roadFunction
20      highway1 from n1 to n2 function highwayFunction
21      highway2 from n2 to n3 function highwayFunction
22      highway3 from n3 to n6 function specialFunction
23      highway4 from n6 to n5 function highwayFunction
```

Task: Q06ATNW (4/4)

Task (continuation)

Correct solution

☑ Possible match 2, Possible match 4

Evaluation 2020

Parameter	Value	Parameter	Value
Answer Cell	Yes	NegPointsP	10
CorAnswersString	Yes	WrongAnswAllowed	0 (default)
Points	10	MissingAnswAllowed	1 (default)
WrgAnswersString	No (default)	MaxPointsToGet	10 (default)

Evaluation 2021

Parameter	Value	Parameter	Value
Answer Cell	Yes	NegPointsP	5 (default)
CorAnswersString	Yes	WrongAnswAllowed	0 (default)
Points	5	MissingAnswAllowed	1 (default)
WrgAnswersString	No (default)	MaxPointsToGet	10 (default)

Task: Q07ATALL (1/2)

Introduction

In this task, you first see a complete program. After that, you are shown excerpts from this program and you are asked to associate the correct semantics (meaning) with the language elements shown in the excerpt. Thus, it is your task to associate the correct semantics to pre-selected language elements.

Task

```
1  model q6nw
2  products
3    stuff weight 1.0
4  functions
5    durationFunction roadFunction  2.5 * length + 3.2
6    durationFunction highwayFunction  1.2 * length + 1.3
7  network
8    nodes
9      n0 at (-2, -2) isDepot stuff sprouts vehicles customers n1, n2, n4, n5 at 0 latestTime 850
10     n1 at (3, -4) hasDemand stuff units 20 earliestTime 10 latestTime 300 serviceTime 7
11     n2 at (0, -3) hasDemand stuff units 20 earliestTime 20 latestTime 250 serviceTime 7
12     n3 at (-5,  4) hasDemand stuff units 50 earliestTime 0 latestTime 140  serviceTime 10
13     n4 at (-2, -6) hasDemand stuff units 25 earliestTime 0 latestTime 120 serviceTime 10
14     n5 at (2,  0) hasDemand stuff units 25 earliestTime 0 latestTime 140 serviceTime 10
15    edges
16      group roadGroup function roadFunction members
17        road1 from n0 to n4
18        road2 from n0 to n5
19        road3 from n0 to n2
20        road4 from n0 to n3
21        road5 from n1 to n2
22        road6 from n1 to n4
23      group highwayGroup function highwayFunction members
24        highway3 from n3 to n5
25        highway4 from n2 to n5
26    agentTypes
27      agentType vehicles congestionFactor 0 maxWeight 180
28        behaviour awt awaitTour when finished do die
29        behaviour die vanish
```

1st Element

```
4  functions
5    durationFunction roadFunction  2.5 * length + 3.2
```

Which description of the sematics of the the durationFunction element is the most appropriate?

○ It is used for single customers (Services). Together with an expression that refers to the respective customer it determines how long the time window of this customer is opened.

○ It is used for single vehicles (agents). Together with an expression it determines the costs that occur upon deployment of the respective vehicle (agent).

○ It is used for single edges, that is the connection between two customers. Together with an expression it determines how long it takes a vehicle (agent) to travel the respective edge.

○ It is used for single depots. Together with an expression it determines the capacity of the vehicles (agents) starting from that depot.

Task: Q07ATALL (2/2)

Task (continuation)

2nd Element

```
15  edges
16    group roadGroup function roadFunction members
```

Which explanation concerning the meaning of the depicted group element in combination with the ensuing definition of edges in the context of the complete program is most appropriate?

○ It allows to group agents (vehicles) that will then jointly travel the respective edge

○ All edges (connections between two nodes) must be associated with a group because only via a group it is possible to set the duration function of an edge.

○ Edges of a given group automatically constitute a path and thus share the same congestionFactor.

○ They are an optional language element that may facillitate the definition of edges. Especially in cases in which a large number of edges are assigned the same (duration) function.

Correct solution

1st Element

⊛ It is used for single edges, that is the connection between two customers. Together with an expression it determines how long it takes a vehicle (agent) to travel the respective edge.

2nd Element

⊛ They are an optional language element that may facillitate the definition of edges. Especially in cases in which a large number of edges are assigned the same (duration) function.

Evaluation 2020, 2021

Non-attempt iff both tasks were not answered.

	Parameter	Value	Parameter	Value
1st Element	Answer Cell	Yes	NegPointsP	5 (default)
	CorAnswersString	Yes	WrongAnswAllowed	0 (default)
	Points	5	MissingAnswAllowed	0 (default)
	WrgAnswersString	No (default)	MaxPointsToGet	5 (default)
	Parameter	Value	Parameter	Value
2nd Element	Answer Cell	Yes	NegPointsP	5 (default)
	CorAnswersString	Yes	WrongAnswAllowed	0 (default)
	Points	5	MissingAnswAllowed	0 (default)
	WrgAnswersString	No (default)	MaxPointsToGet	5 (default)

Task: Q08ATALL (1/2)

Introduction

In this task, you first see a complete program. The program features some comments. These comments represent TODOs, i.e. future programming tasks. In addition, you'll find some questions that ask for the elements, that will be affected by these TODOs. Your task is to answer these questions correctly.[a]

Task

```
1   model q08all
2   products
3     sp weight 1.0
4     pp weight 1.0
5   functions
6     durationFunction roadFunction  2.5 * length + 3.2
7     durationFunction highwayFunction  1.2 * length + 1.3
8   network
9     // TODO: The customer with the longest service time must be added as a customer to the
10    // respective depot
11    nodes
12    n0 at (2,4) isDepot sp sprouts vehicles customers n1, n4, n6 at 0 latestTime 850
13    n1 at (3,-4) hasDemand sp units 20 earliestTime 10 latestTime 300 serviceTime 7
14    n2 at (0,-3) hasDemand sp units 20, pp units 10 earliestTime 20 latestTime 250 serviceTime 7
15    n3 at (-5,4) hasDemand sp units 50 earliestTime 0 latestTime 140  serviceTime 30
16    n4 at (-2,-6) hasDemand sp units 25 earliestTime 0 latestTime 120 serviceTime 10
17    n5 at (2,0) hasDemand sp units 30, pp units 40  earliestTime 0 latestTime 140 serviceTime 10
18    n6 at (-2,-2) hasDemand sp units 60, pp units 70 earliestTime 0 latestTime 150 serviceTime 10
19    n7 at (-5,-2) hasDemand pp units 20 earliestTime 20 latestTime 220 serviceTime 8
20    n8 at (-5,-6) isDepot pp sprouts vehicles customers n5, n6, n7 at 0 latestTime 500
21    edges
22    group roadGroup function roadFunction members
23      road01 from n0 to n4
24      road02 from n0 to n5
25      road03 from n3 to n6
26      road04 from n0 to n3
27      road05 from n1 to n2
28      road06 from n1 to n4
29      road07 from n3 to n0
30      road08 from n5 to n0
31      road09 from n3 to n7
32      road10 from n7 to n8
33      road11 from n6 to n2
34      road12 from n8 to n4
35    group highwayGroup function highwayFunction members
36      // TODO: two more highways will later be modelled here:
37      // one going from the soap depot to the customer with the highes demands in both soap
38      // and paper. The other going from the customer with the highest soap and
39      // paper demands to the paper depot.
40      highway3 from n3 to n5
41      highway4 from n2 to n5
42    agentTypes
43      agentType vehicles congestionFactor 0 maxWeight 180
44      behaviour awt awaitTour when finished do die
45      behaviour die vanish
```

1. Which customer must be added?

Read the comment in lines 09 and 10. Which customer must be added to the respective depot according to the comment?

Note: Some of the provided answers might not be customers.

○ n0	○ n1	○ n2
○ n3	○ n4	○ n5
○ n6	○ n7	○ n8

---

[a]Coordinates were originally specified with a blank space after the comma. Original product names were 'soap' and 'paper'.

Task: Q08ATALL (2/2)

Task (continuation)

2. Which is the correct depot?
Read the comment in lines 09 and 10. To which depot must the customer be added to?
Note: Some of the provided answers might not be depots.

○ n0	○ n1	○ n2
○ n3	○ n4	○ n5
○ n6	○ n7	○ n8

3. Which nodes are affected?
Read the comment that spans from lines 36 to line 39. What are the three nodes this comment refers to?
Note: Some of the provided answers might not be customers.

☐ n0	☐ n1	☐ n2
☐ n3	☐ n4	☐ n5
☐ n6	☐ n7	☐ n8

Correct solution

1.	◉ n3
2.	◉ n0
3.	☑ n0, ☑ n6, ☑ n8

Evaluation 2020, 2021

Non-attempt iff all three tasks were not answered.

1.

Parameter	Value	Parameter	Value
Answer Cell	Yes	NegPointsP	2
CorAnswersString	Yes	WrongAnswAllowed	0 (default)
Points	2	MissingAnswAllowed	0 (default)
WrgAnswersString	No (default)	MaxPointsToGet	2

2.

Parameter	Value	Parameter	Value
Answer Cell	Yes	NegPointsP	2
CorAnswersString	Yes	WrongAnswAllowed	0 (default)
Points	2	MissingAnswAllowed	0 (default)
WrgAnswersString	No (default)	MaxPointsToGet	2

3.

Parameter	Value	Parameter	Value
Answer Cell	Yes	NegPointsP	2
CorAnswersString	Yes	WrongAnswAllowed	0 (default)
Points	2	MissingAnswAllowed	0 (default)
WrgAnswersString	No (default)	MaxPointsToGet	6

Task: Q09ATNW (1/2)

Introduction

In this task you'll find a graphical representation of a network. The network comprises a set of customers with demands, time windows and service times. Further below is the corresponding program. However, the program still shows some gaps. The gaps can also be seen in the illustration: they correspond to the elements drawn using green color. Your task is to fill in the gaps so that the program describes the complete network.

Task
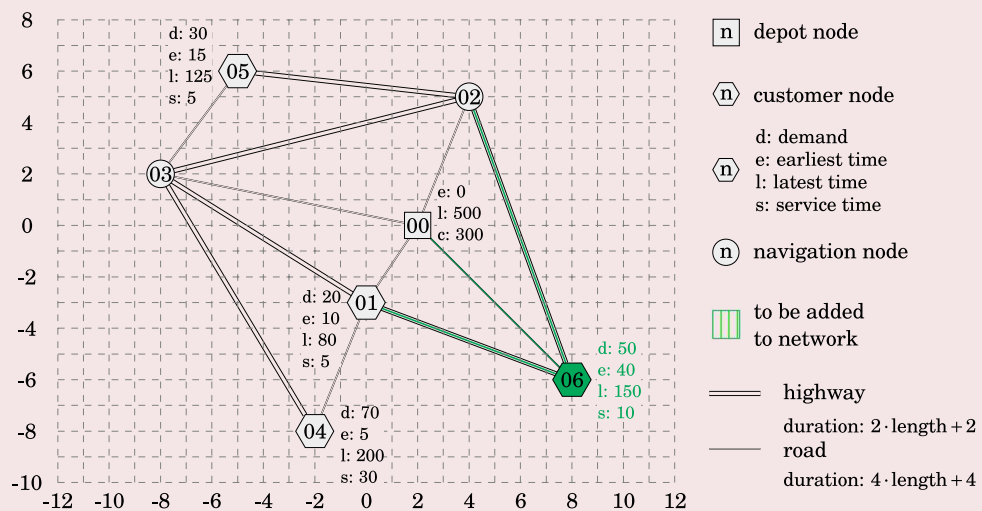

```
1   model q9nw
2   products
3     stuff weight 1.0
4   functions
5     durationFunction roadFunction  4 * length + 4
6     durationFunction highwayFunction  2 * length + 2
7   network
8     nodes
9       n0 at (2, 0) isDepot stuff sprouts vehicles customers n1, n4, n5 at 0 latestTime 500
10      n1 at (0, -3) hasDemand stuff units 20 earliestTime 10 latestTime 80 serviceTime 5
11      n2 at (4, 5)
12      n3 at (-8, 2)
13      n4 at (-2, -8) hasDemand stuff units 70 earliestTime 5 latestTime 200 serviceTime 30
14      n5 at (-5, 6) hasDemand stuff units 30 earliestTime 15 latestTime 125 serviceTime 5
15      // TASK 1: SOME TEXT TO BE ADDED HERE
16    edges
17      group roadGroup function roadFunction members
18        road1 from n0 to n1
19        road2 from n0 to n2
20        road3 from n0 to n3
21        road4 from n1 to n4
22        road5 from n3 to n5
23        // TASK 2: SOME TEXT TO BE ADDED HERE
24      group highwayGroup [type1 ultraThin green] function highwayFunction members
25        highway1 from n5 to n2
26        highway2 from n3 to n2
27        highway3 from n3 to n1
28        highway4 from n3 to n4
29        // TASK 3: SOME TEXT TO BE ADDED HERE
30  agentTypes
31    agentType vehicles congestionFactor 0 maxWeight 180
32      behaviour awt awaitTour when finished do die
33      behaviour die vanish
```

Task: Q09ATNW (2/2)

Task (continuation)

Task 1: In the following text area, enter the code (one or more lines) that should replace the comment "TASK 1: SOME TEXT TO BE ADDED HERE" in the complete program above.

> Enter answer here

Task 2: In the following text area, enter the code (one or more lines) that should replace the comment " TASK 2: SOME TEXT TO BE ADDED HERE " in the complete program above.

> Enter answer here

Task 3: In the following text area, enter the code (one or more lines) that should replace the comment " TASK 3: SOME TEXT TO BE ADDED HERE " in the complete program above.

> Enter answer here

Correct solution

Task 1:

```
15  n6 at (8, -6) hasDemand stuff units 50 earliestTime 40 latestTime 150 serviceTime 10
```

Task 2:

```
23  road6 from n0 to n6
```

Task 3:

```
29  highway5 from n1 to n6
30  highway6 from n2 to n6
```

Evaluation 2020, 2021

Non-attempt iff three tasks were not answered.

Task 1: 6 Points.
Task 2: 2 Points.
Task 3: 2 Points.

Task: Q09ATAG (1/4)

Introduction

In this task, you'll find an incomplete program together with a visual representation of the network represented by this program. Complete the program in a way so that the target network and agent behaviour visualised at the bottom of the page result. Note that the modelled behaviour, i.e. the tour, must be a likely outcome of the agent behaviour that you modelled in the program.

Note: In this task, there are some nodes for which demands, time windows, and service times are to be defined even though the vehicle must not service them! Navigation nodes (as well as those customer not supposed to be serviced) can be visited by the agent (vehicle) but they will not receive a delivery. Find a way to program this.
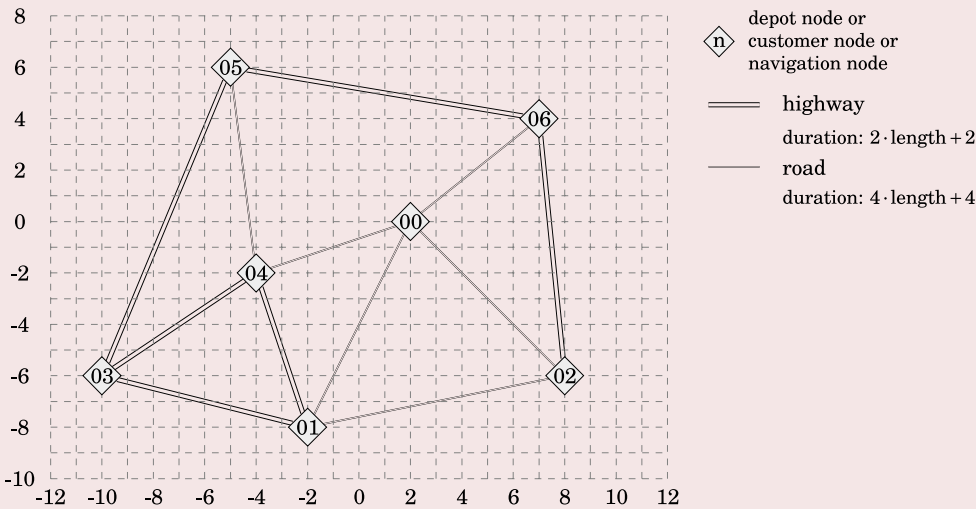
Task

```
1  model q09atag
2  products
3    stuff weight 1.0
4  functions
5    durationFunction roadFunction  4 * length + 4
6    durationFunction highwayFunction  2 * length + 2
7  network
8    nodes
9    // TASK 1 BEGINNING
10    n0 at (2, 0)
11    n1 at (-2, -8) hasDemand stuff units 30 earliestTime 10 latestTime 90 serviceTime 5
12    n2 at (8, -6)
13    n3 at (-10, -6)
14    n4 at (-4, -2)
15    n5 at (-5, 6)
16    n6 at (7, 4)
17    // TASK 1 END
18    edges
19      group roadGroup function roadFunction members
20        road1 from n0 to n6
21        road2 from n0 to n1
22        road3 from n0 to n4
23        road4 from n0 to n2
24        road5 from n1 to n2
25        road6 from n4 to n5
26      group highwayGroup function highwayFunction members
27        highway1 from n3 to n5
28        highway2 from n1 to n3
29        highway3 from n1 to n4
30        highway4 from n4 to n3
31        highway5 from n6 to n5
32        highway6 from n6 to n2
33  agentTypes
34    // TASK 2 BEGINNING
35    agentType vehicles
36    behaviour awt awaitTour when finished do die
37    behaviour die vanish
38    // TASK 2 END
```
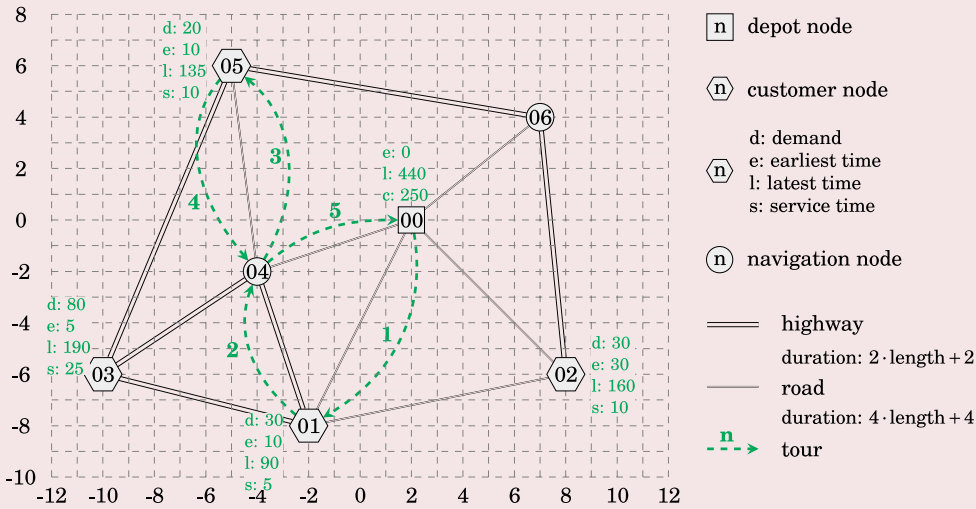
Task: Q09ATAG (2/4)

Task (continuation)

Current state

Target state

Task: Q09ATAG (3/4)

Task (continuation)

<u>Task 1:</u> From the listing above, copy and paste the code betweenthe comment "TASK 1 : BEGINNING" and the comment "TASK 1 END". Complete the copied code for the network (including depot and customer definitions) so that it conforms to the target state depicted in the illustration.

> Enter answer here

<u>Task 2:</u> From the listing above, copy and paste the code betweenthe comment "TASK 2 : BEGINNING" and the comment "TASK 2 END". Complete the copied code for the network (including depot and customer definitions) so that it conforms to the target state depicted in the illustration.

> Enter answer here

Correct solution

<u>Task 1:</u>

```
10  n0 at (2, 0) isDepot stuff sprouts vehicles customers n1, n5 at 0 latestTime 440
11  n1 at (-2, -8) hasDemand stuff units 30 earliestTime 10 latestTime 90 serviceTime 5
12  n2 at (8, -6) hasDemand stuff units 30 earliestTime 30 latestTime 160 serviceTime 10
13  n3 at (-10, -6) hasDemand stuff units 80 earliestTime 5 latestTime 190 serviceTime 25
14  n4 at (-4, -2)
15  n5 at (-5, 6) hasDemand stuff units 20 earliestTime 10 latestTime 135 serviceTime 10
16  n6 at (7, 4)
```

<u>Task 2:</u>

```
33  agentType vehicles congestionFactor 0 maxWeight 250
34      behaviour awt awaitTour when finished do die
35      behaviour die vanish
```

Task: Q09ATAG (4/4)

Evaluation 2020

Due to a mistake in the creation of the question, the intended answer for the second task, i.e. the addition of '`maxWeight 250`' was already given in the text. For this reason, the second part of this question was removed from the evaluation of the study for both Athos and JSprit.

Task 1: 10 Points.
Task 2: Not evaluated

Evaluation 2022

Non-attempt iff Task1 was not answered.

Task 1: 8 Points. Wrong depot definition and missing customers -4 P. (but +1 Point, if latestTime + value correctly specified, i.e. in total - 3 P.); Wrong depot definition but correc product and correct agent type -3 P. (cannot be combined with latest time +1!); wrong product name -2 P.; completely missing depot definition -4 P.; wrong customer declaration (too many, too few) -2 P.; wrong product and wrong customer declaration -3 P.; wrong code -8 P.; wrong value for demand or time -1 P.; completely wrong demand specification -4 P.; wrong demand specification (one demand specificatoon completely right) -2 P.; syntax error -1 P.; blank space missing (syntax error) -1 P.; missing latest time -2 P.; missing code -1 P.

Task 2: 2 Points. Missing maxWeight -2 P.; wrong maximum weight value -1 P.; syntax error -1 P. (-2 P. max.),; completely wrong code -2 P.; missing code, e.g. behaviour (but maxWeight specificaiton correct) 1 P.; changed agent name (no deduction) (-0 P.); wrong keyword (-1 P.); superfluous code -1 P.

Task: Q10ATNW (1/2)

Introduction

In this task, you will find an illustration of a network comprised of highways, roads, navigation and customer nodes. In addition, you will find a program that corresponds to this illustration.In the illustration, some elements (e.g. nodes, demands, highways, etc.) are drawn in red color. These are the elements that are to be removed from the program.

Note: At the bottom of the page is a text area. Copy and paste the code that corresponds to the elements that need to be deleted into this text area. The order in which you paste the elements is not important.

Task
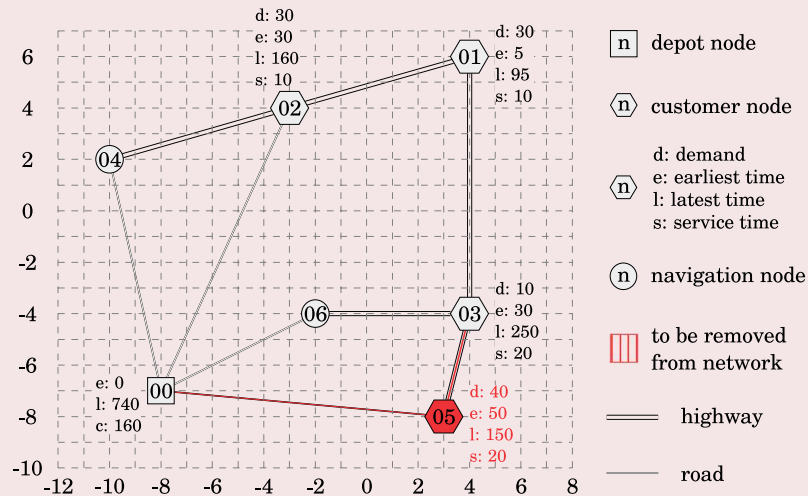

```
1   model q6nw [xmin -15 xmax 25 ymin -10 ymax 10]
2   products
3     stuff weight 1.0
4   functions
5     durationFunction roadFunction  4 * length + 4
6     durationFunction highwayFunction  2 * length + 2
7   network
8     nodes
9       n0 at (-8, -7) isDepot stuff sprouts vehicles latestTime 740
10      n1 at (4, 6) hasDemand stuff units 30 earliestTime 5 latestTime 95 serviceTime 10
11      n2 at (-3, 4) hasDemand stuff units 30 earliestTime 30 latestTime 160 serviceTime 10
12      n3 at (4, -4) hasDemand stuff units 10 earliestTime 30 latestTime 250 serviceTime 20
13      n4 at (-10, 2)
14      n5 at (3, -8) hasDemand stuff units 40 earliestTime 50 latestTime 150 serviceTime 20
15      n6 at (-2, -4)
16    edges
17      group roadGroup function roadFunction members
18        road1 from n0 to n4
19        road2 from n0 to n2
20        road3 from n0 to n6
21        road4 from n0 to n5
22      group highwayGroup function highwayFunction members
23        highway1 from n4 to n2
24        highway2 from n2 to n1
25        highway3 from n1 to n3
26        highway4 from n6 to n3
27        highway5 from n3 to n5
28  agentTypes
29    agentType vehicles maxWeight 160
30      behaviour awt awaitTour when finished do die
31      behaviour die vanish
```

Task: Q10ATNW (2/2)

Task (continuation)

From above Athos model, copy those lines that need to be deleted and paste them in the following text area (in an arbitrary order).

Enter answer here

Correct solution

```
14  n5 at (3, -8) hasDemand stuff units 40 earliestTime 50 latestTime 150 serviceTime 20
21  highway5 from n3 to n5
27  road4 from n0 to n5
```

Evaluation 2020, 2021

Scheme: 10 Points. Missing removal (of either customer, road or highway): **-5 Points**.

Task: Q11ATALL (1/3)

Introduction

In this task, you will find two graphical representations of networks that are comprised of highways, roads, navigation nodes and customer nodes.

In the first graphical representation you will find one depot together with **seven customer nodes.** The customer nodes are visited by two different tours.

After the two graphical network representations, you will find a program that corresponds **to the first graphical network representation** (i.e. it describes this representation).

The second graphical network representation displays the target state in which you are to transform the program: One of the customer nodes was transformed into a depot from which a new product is delivered to some of the customers. These customers only have a demand for the new product and do no longer require the old one (in other words, they are only supplied by one depot).

The program features comments that mark the beginning and the end of program sections that must be modified in order to transform the program into the target state. At the end of the page, there are corresponding text areas, in which you copy, paste and modify the original code in a suitable way.

Task
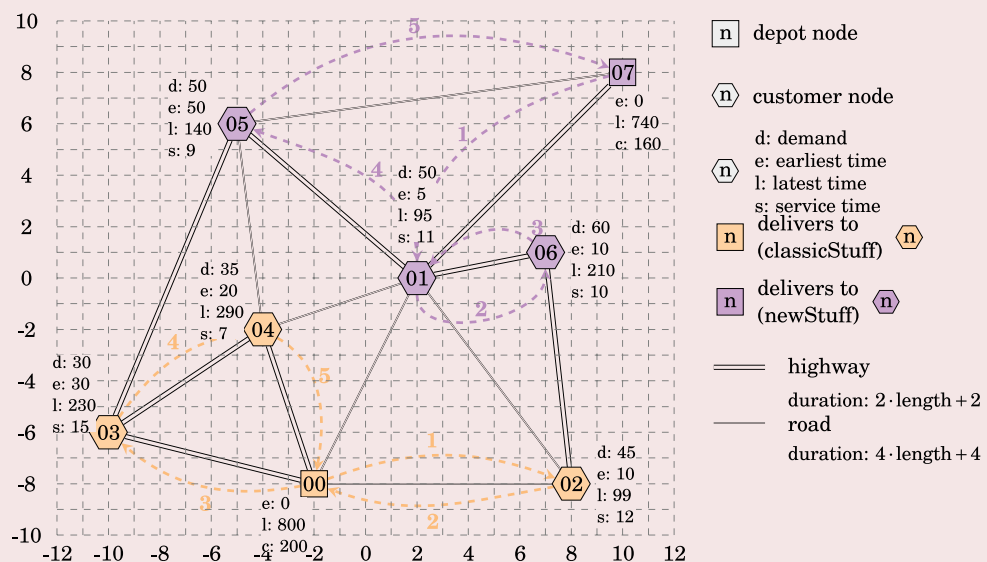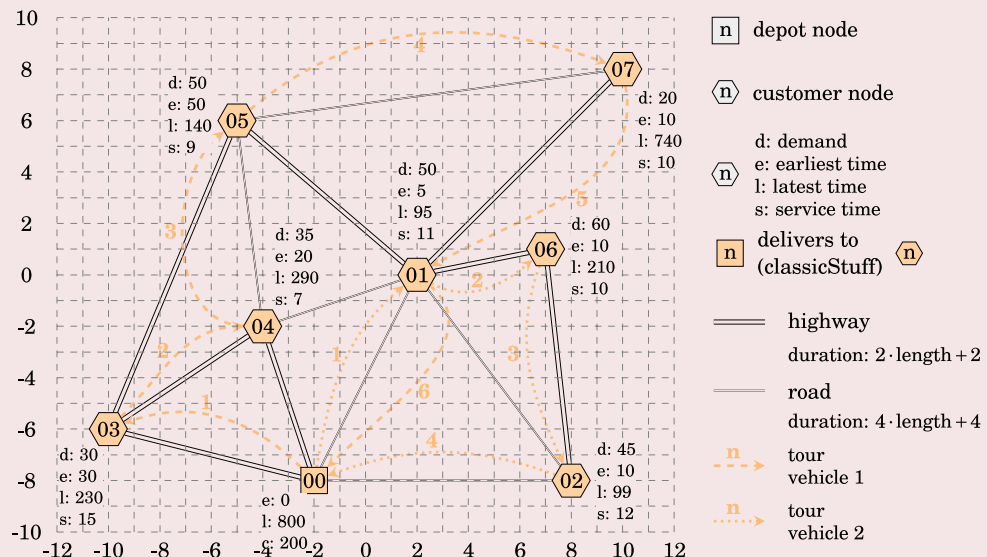
Task: Q11ATALL (2/3)

Task (continuation)

```
1   model q11AllStartState
2   products
3     p0 weight 1.0
4     p1 1.0
5   functions
6     durationFunction roadFunction  4 * length + 4
7     durationFunction highwayFunction  2 * length + 2
8   network
9     nodes
10      // TASK 1 BEGINNING
11      n0 at (-2,-8) isDepot p0 sprouts vDepot0 customers n1,n2,n3,n4,n5,n6,n7 at 0 latestTime 800
12      n1 at (2, 0) hasDemand p0 units 50 earliestTime 5 latestTime 95 serviceTime 11
13      n2 at (8, -8) hasDemand p0 units 45 earliestTime 10 latestTime 99 serviceTime 12
14      n3 at (-10, -6) hasDemand p0 units 30 earliestTime 30 latestTime 230 serviceTime 15
15      n4 at (-4, -2) hasDemand p0 units 35 earliestTime 20 latestTime 290 serviceTime 7
16      n5 at (-5, 6) hasDemand p0 units 50 earliestTime 50 latestTime 140 serviceTime 9
17      n6 at (7, 1) hasDemand p0 units 60 earliestTime 10 latestTime 210 serviceTime 10
18      n7 at (10, 8) hasDemand p0 units 20  earliestTime 10 latestTime 740 serviceTime 10
19      // TASK 1 END
20    edges
21      group roadGroup function roadFunction members
22        road1 from n5 to n7
23        road2 from n4 to n5
24        road3 from n4 to n1
25        road4 from n0 to n1
26        road5 from n0 to n2
27        road6 from n1 to n2
28      group highwayGroup function highwayFunction members
29        highway1 from n3 to n5
30        highway2 from n3 to n4
31        highway3 from n0 to n3
32        highway4 from n0 to n4
33        highway5 from n1 to n5
34        highway6 from n2 to n6
35        highway7 from n1 to n6
36        highway8 from n1 to n7
37  agentTypes
38    // TASK 2 BEGINNING
39    agentType vDepot0 congestionFactor 0 maxWeight 200
40      behaviour awt awaitTour when finished do die
41      behaviour die vanish
42    // TASK 2 END
```

Task 1: From the listing above, copy and paste the code betweenthe comment "TASK 1 : BEGINNING" and the comment "TASK 1 END". Complete / modify the copied code for the network (including depot and customer definitions) so that it conforms to the target state depicted in the illustration.

Enter answer here

Task: Q11ATALL (3/3)

Task (continuation)

Task 2: From the listing above, copy and paste the code betweenthe comment "TASK 2 : BEGINNING" and the comment "TASK 2 END". Complete / modify the copied code for the network (including depot and customer definitions) so that it conforms to the target state depicted in the illustration.

Enter answer here

Correct solution

Task 1:

```
11  n0 at (-2, -8) isDepot p0 sprouts vDepot0 customers n2, n3, n4 at 0 latestTime 800
12  n1 at (2, 0) hasDemand p1 units 50 earliestTime 5 latestTime 95 serviceTime 11
13  n2 at (8, -8) hasDemand p0 units 45 earliestTime 10 latestTime 99 serviceTime 12
14  n3 at (-10, -6) hasDemand p0 units 30 earliestTime 30 latestTime 230 serviceTime 15
15  n4 at (-4, -2) hasDemand p0 units 35 earliestTime 20 latestTime 290 serviceTime 7
16  n5 at (-5, 6) hasDemand p1 units 50 earliestTime 50 latestTime 140 serviceTime 9
17  n6 at (7, 1) hasDemand p1 units 60 earliestTime 10 latestTime 210 serviceTime 10
18  n7 at (10, 8) isDepot p1 sprouts vDepot1 customers n1, n5, n6 at 0 latestTime 740
```

Task 2:

```
42  agentType vDepot1 congestionFactor 0 maxWeight 160
43      behaviour awt awaitTour when finished do die
44      behaviour die vanish
```

Evaluation 2020

Non-attempt iff both tasks were not answered.

Task 1: 6 Points.
Task 2: 4 Points.

Evaluation 2021

Non-attempt iff both tasks were not answered.

The attribution of points was modified. For Athos, the second task required considerably less effort and participants could make less mistakes compared to the first task. With the corresponding JSprit question, both tasks were of similar difficulty.

Task 1: 7 Points.
Task 2: 3 Points.