

i Front page

IN5130/IN9130/INF5150/ITLED4320 - Unassailable IT-systems

Final exam

Monday 26. November 2018

Length: 09:00 - 13:00 (4 hours)

All printed and written exam resources are allowed.

This exam set is only available in English. You may choose to answer this exam in Norwegian or English.

The course teacher will come to the exam venue some time after the exam has begun.












Please read the whole exam set before attempting to answer any questions.

Good luck!

1(a) Question 1a

Question 1a

What is the length of the shortest positive trace in the sequence diagram **Driver taking measures**? Explain your answer.

Format | **B** | *I* | U | x_2 | x^2 | I_x |  |  |  |  |  |  |  |  |  |  | Σ | 

Words: 0

Maximum marks: 5

1(b) Question 1b

Question 1b

What is the length of the shortest negative trace in the sequence diagram **Driver taking measures**? Explain your answer.

Format | B | I | U | x₂ | x² | I_x | [Copy] | [Paste] | [Undo] | [Redo] | [List] | [List] | Ω | [Table] | [Pen] | Σ | ABC | [Close]

Words: 0

Maximum marks: 6

1(c) **Question 1c****Question 1c**

Which events may occur as the first event in a positive trace of the sequence diagram **Driver taking measures**? Explain your answer.

Format | B | I | U | x₂ | x² | I_x | [Copy] | [Paste] | [Undo] | [Redo] | [List] | [List] | Ω | [Table] | [Pen] | Σ | ABC | [Close]

Words: 0

Maximum marks: 6

1(d) **Question 1d****Question 1d**

Which events may occur as the first event in a negative trace of the sequence diagram **Driver taking measures**? Explain your answer.

Format | B | I | U | x₂ | x² | I_x | [copy] | [undo] | [redo] | [list] | [list] | Ω | [table] | [edit] | Σ | ABC | [close]

Words: 0

Maximum marks: 6

1(e) **Question 1e**

Question 1e

Which events may occur as the last event in a positive trace of the sequence diagram **Driver taking measures**? Explain your answer.

Format | B | I | U | x₂ | x² | I_x | [copy] | [undo] | [redo] | [list] | [list] | Ω | [table] | [edit] | Σ | ABC | [close]

Words: 0

Maximum marks: 6

1(f) **Question 1f**

Question 1f

Which events may occur as the last event in a negative trace of the sequence diagram **Driver taking**

measures? Explain your answer.

Format | **B** | *I* | U | x_2 | x^2 | \int_x | | | | | | | Ω | | | Σ | ABC |

Words: 0

Maximum marks: 6

2(a) Question 2a

Question 2a

Let **Driver taking measures_1** denote the sequence diagram obtained from **Driver taking measures** by substituting the only occurrence of the keyword **opt** with the keyword **veto**.

Is **Driver taking measures_1** a refinement of **Driver taking measures**? If so, is it a pure supplementing, a pure narrowing, or a combination of both supplementing and narrowing? Explain your answer.

Format | **B** | *I* | U | x_2 | x^2 | \int_x | | | | | | | Ω | | | Σ | ABC |

Words: 0

Maximum marks: 5

2(b) Question 2b

Question 2b

Let **Driver taking measures_2** denote the sequence diagram obtained from **Driver taking measures** by substituting the only occurrence of the keyword **opt** with the keyword **assert**.

Is **Driver taking measures_2** a refinement of **Driver taking measures**? If so, is it a pure supplementing, a pure narrowing, or a combination of both supplementing and narrowing? Explain your answer.

Format | **B** | *I* | U | x_2 | x^2 | I_x | | | | | | | | | | Σ | ABC |

Words: 0

Maximum marks: 6

2(c) **Question 2c**

Question 2c

Let **Driver taking measures_3** denote the sequence diagram obtained from **Driver taking measures** by substituting the only occurrence of the keyword **opt** with the keyword **loop**.

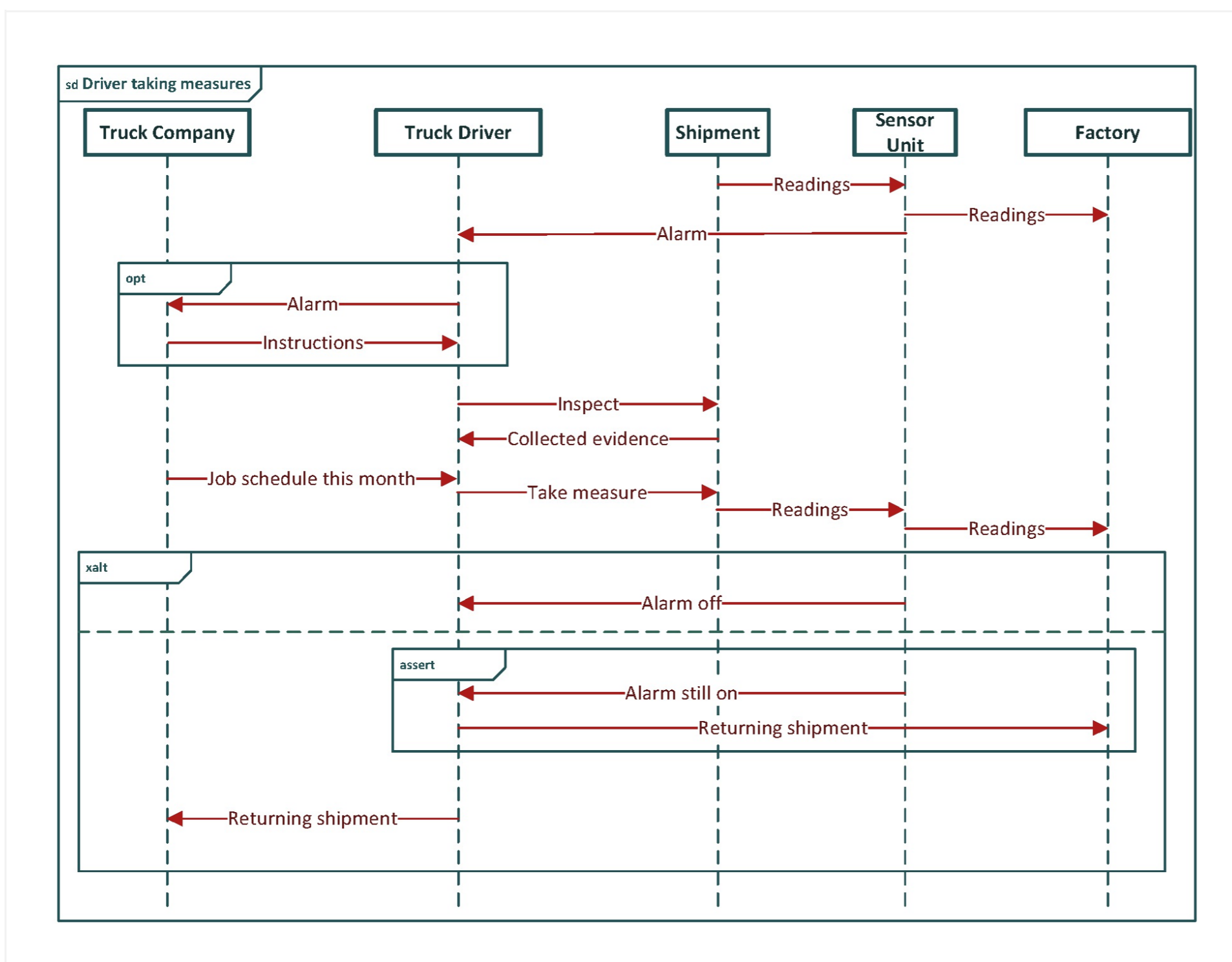
Is **Driver taking measures_3** a refinement of **Driver taking measures**? If so, is it a pure supplementing, a pure narrowing, or a combination of both supplementing and narrowing? Explain your answer.

Format | B | I | U | x₂ | x² | I_x | [Icons] | ABC | [Icons]

Words: 0

Maximum marks: 6

2(d) **Question 2d**



Question 2d

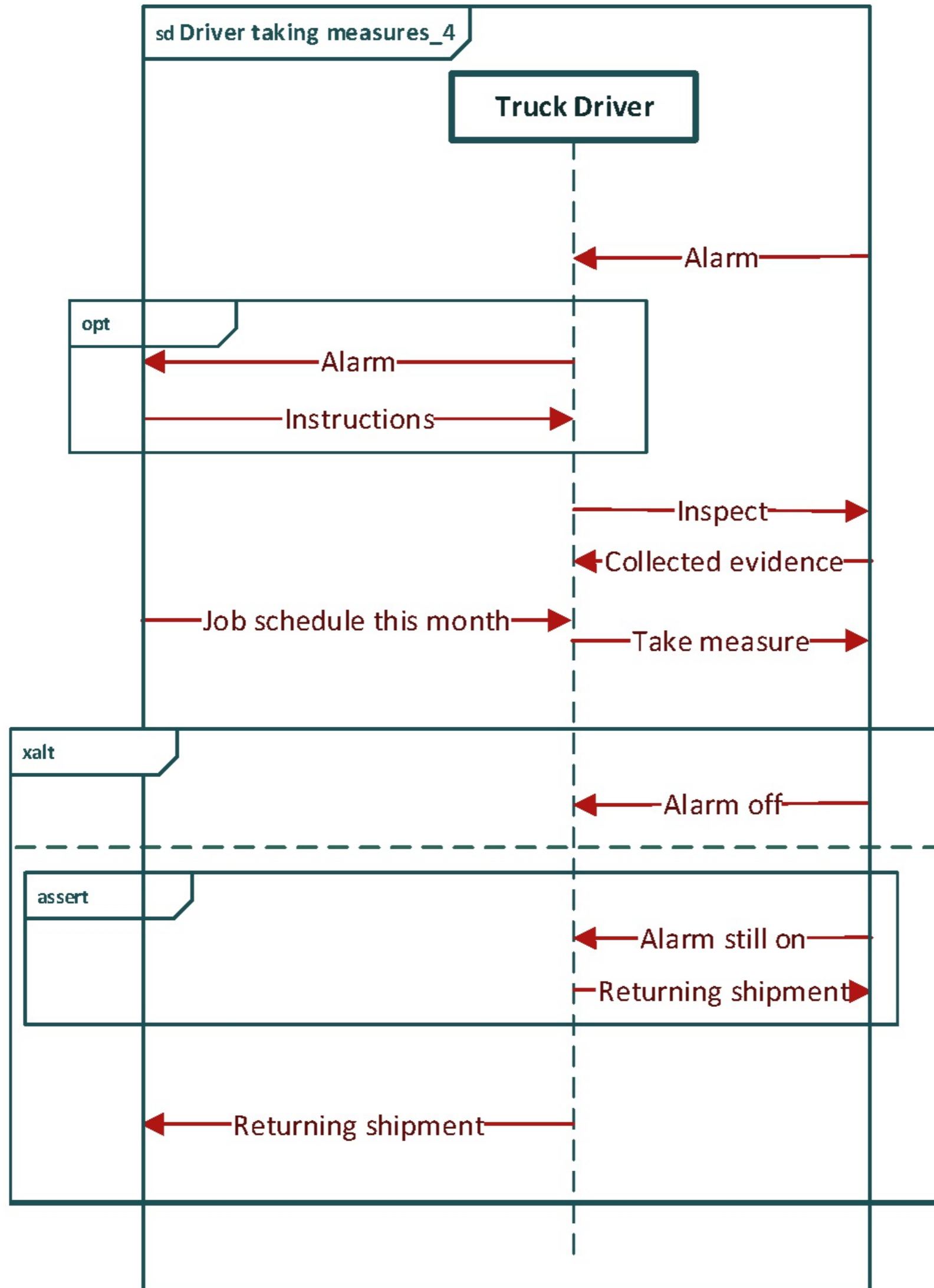
The state machine **Truck driver** does not allow all positive traces with respect to the lifeline Truck Driver in the sequence diagram **Driver taking measures**. Explain in detail how you would extend the state machine **Truck driver** with a new transition (or new transitions) so that every positive trace with respect to the lifeline Truck Driver in the sequence diagram **Driver taking measures** is allowed by your extended state machine **Truck driver₁**.

Format - | **B** *I* U x_2 x^2 | I_x | | | | Ω | | Σ | ABC |

Words: 0












Maximum marks: 6

2(e) **Question 2e**



Question 2e

Assume you have successfully accomplished the previous **Question 2d**. Is the resulting state machine **Truck driver_1** a refinement of the sequence diagram **Driver taking measures_4**? If so, is it a pure supplementing, a pure narrowing, or a combination of both supplementing and narrowing? Explain your answer.

Format - | **B** *I* U x_2 x^2 | I_x |   |    |   | Ω   | Σ | ABC  | 












Words: 0

Maximum marks: 6

2(f) Question 2f**Question 2f**

Explain in detail how to modify the sequence diagram **Driver taking measures** into a sequence diagram **Driver taking measures_5** that is a general refinement of the sequence diagram **Driver taking measure** but not a limited refinement of the sequence diagram **Driver taking measures**.

Fill in your answer here

Format - | **B** *I* U x_2 x^2 | I_x |   |    |   | Ω   | Σ | ABC  | 

Words: 0

Maximum marks: 6

3(a) Question 3a**Question 3a**

Make a good qualitative consequence scale for the asset **Trustworthiness of collaboration partner**. The scale should distinguish between at least 5 different values. Argue its goodness.

Format - | **B** *I* U x_2 x^2 | I_x | | | | Ω | | Σ | ABC |

Words: 0

Maximum marks: 6

3(b) **Question 3b**

Question 3b

Calculate the minimum frequency **f** given that the CORAS diagram fragment is consistent and there are no other possible causes of the threat scenario **s** (no other relations contributing to the frequency of **s**). Explain your answer.

Format - | **B** *I* U x_2 x^2 | I_x | | | | Ω | | Σ | ABC |

Words: 0

Maximum marks: 6

3(c) **Question 3c**

Question 3c

Calculate the maximum frequency f given that the CORAS diagram fragment is consistent and there are no other possible causes of the threat scenario s (no other relations contributing to the frequency of s). Explain your answer.

Format | **B** | *I* | U | x_2 | x^2 | I_x | | | | | | | Ω | | | Σ | ABC |

Words: 0

Maximum marks: 6

3(d) **Question 3d**

Question 3d

Calculate the frequency f and the conditional probability c in the CORAS diagram fragment given that the fragment is consistent and the threat scenario s_1 is the only cause of the threat scenarios s_2 and s_3 (no other relations contributing to the frequencies of s_2 and s_3). Explain your answer.

Format | **B** | *I* | U | x_2 | x^2 | I_x | | | | | | | Ω | | | Σ | ABC |

Words: 0











Maximum marks: 6

3(e) Question 3e

Question 3e

In what respect may **nonrepudiation** be seen as a special case of **integrity**? Explain your answer.

Fill in your answer here

Format | **B** | *I* | U | x_2 | x^2 | I_x |  |  |  |  |  |  |  |  |  | Σ | ABC | 

Words: 0

Maximum marks: 6

Question 1.a
Attached



sd Driver taking measures

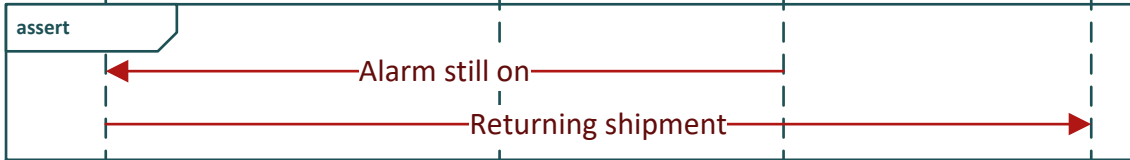
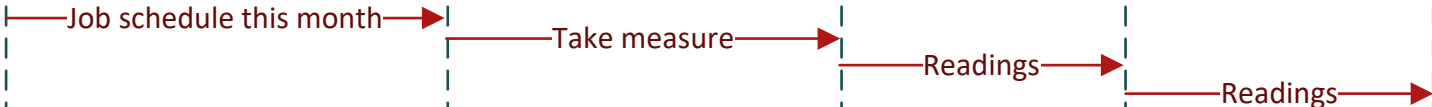
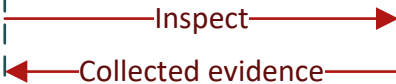
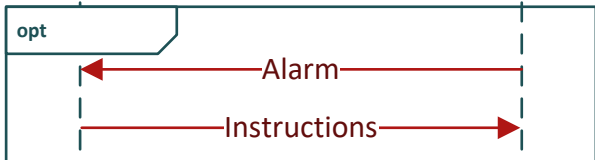
Truck Company

Truck Driver

Shipment

Sensor Unit

Factory



Question 1.b
Attached



sd Driver taking measures

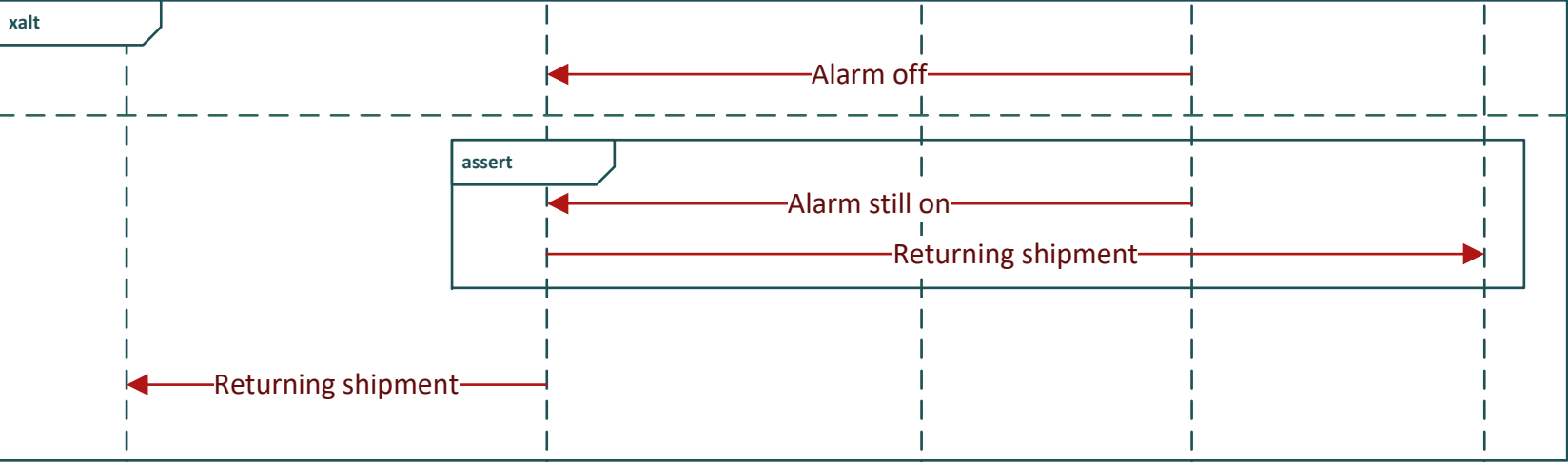
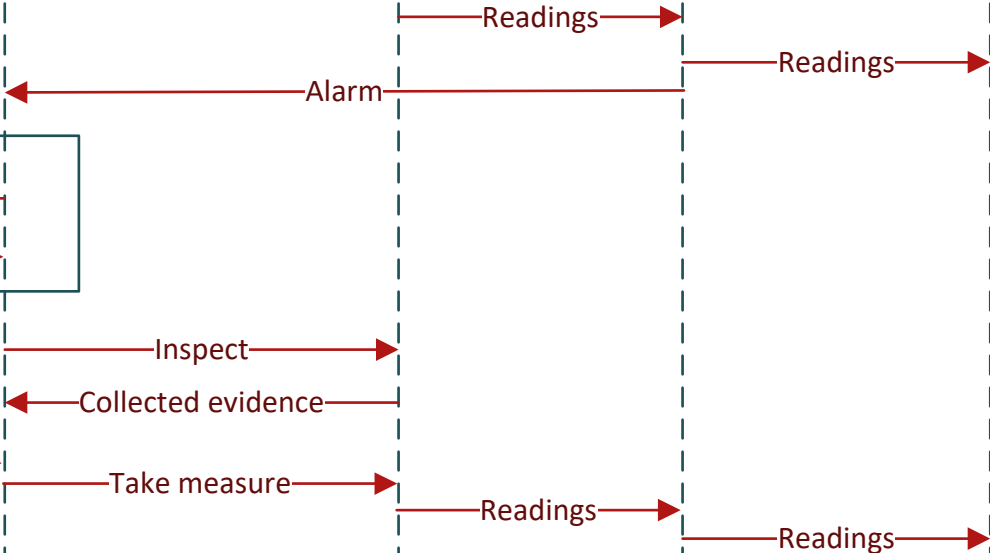
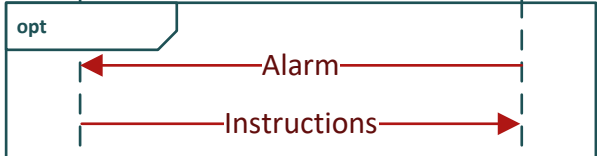
Truck Company

Truck Driver

Shipment

Sensor Unit

Factory



Question 1.c
Attached



sd Driver taking measures

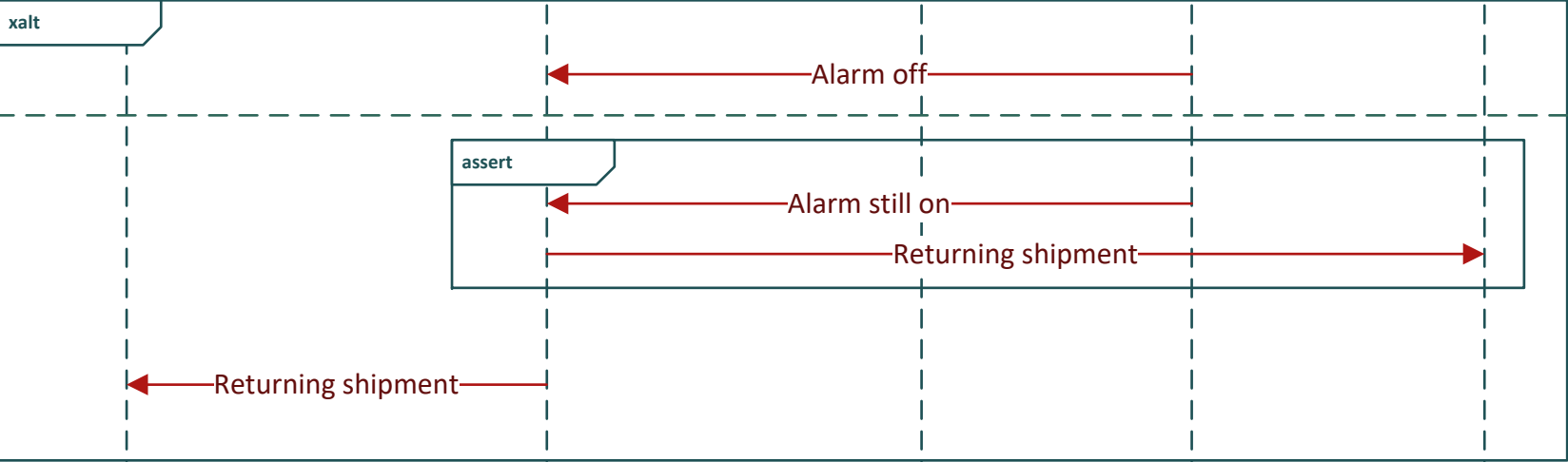
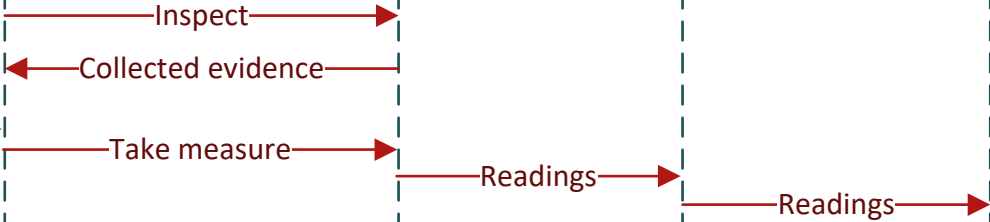
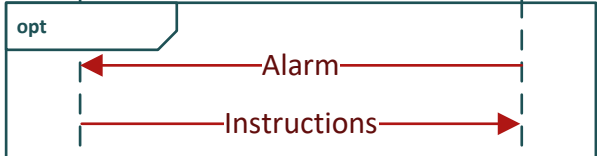
Truck Company

Truck Driver

Shipment

Sensor Unit

Factory



Question 1.d
Attached



sd Driver taking measures

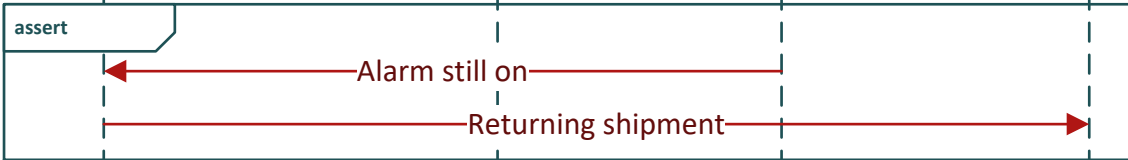
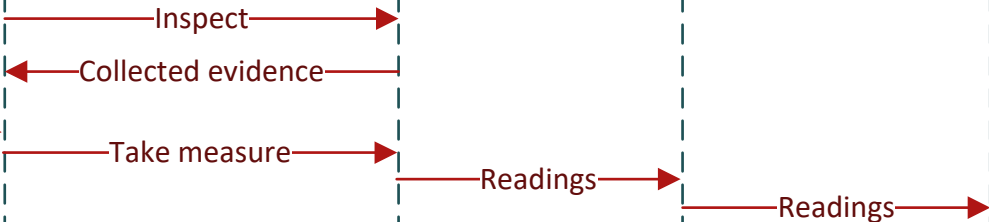
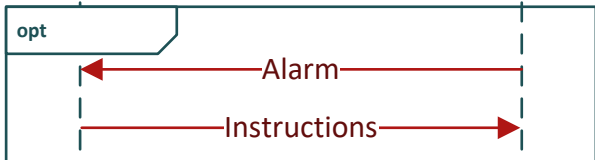
Truck Company

Truck Driver

Shipment

Sensor Unit

Factory



Question 1.e
Attached



sd Driver taking measures

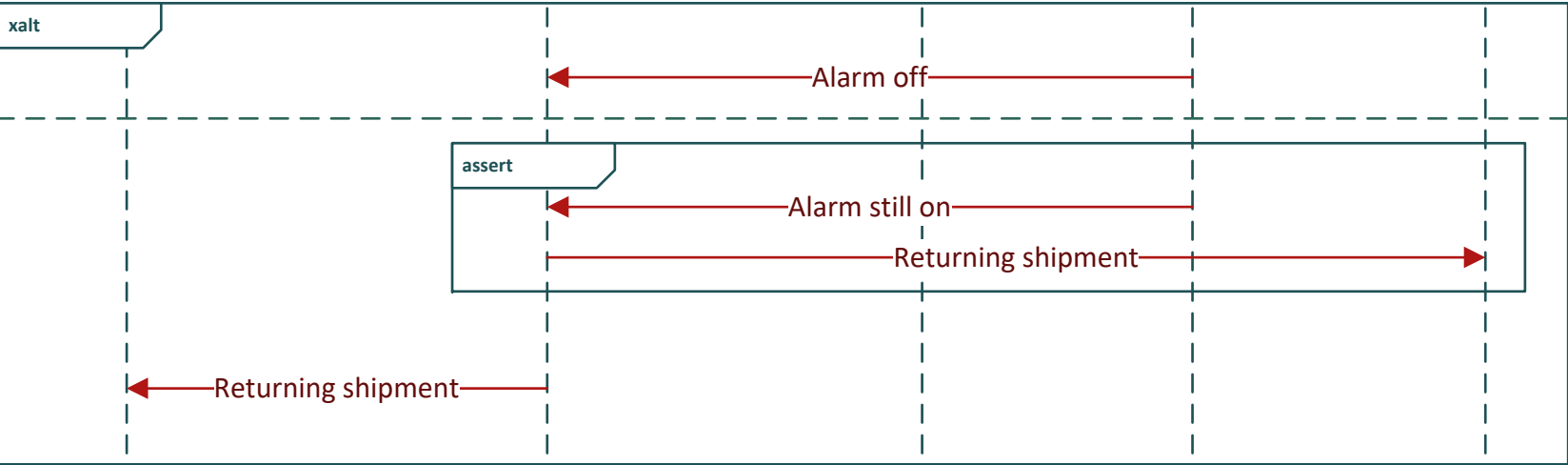
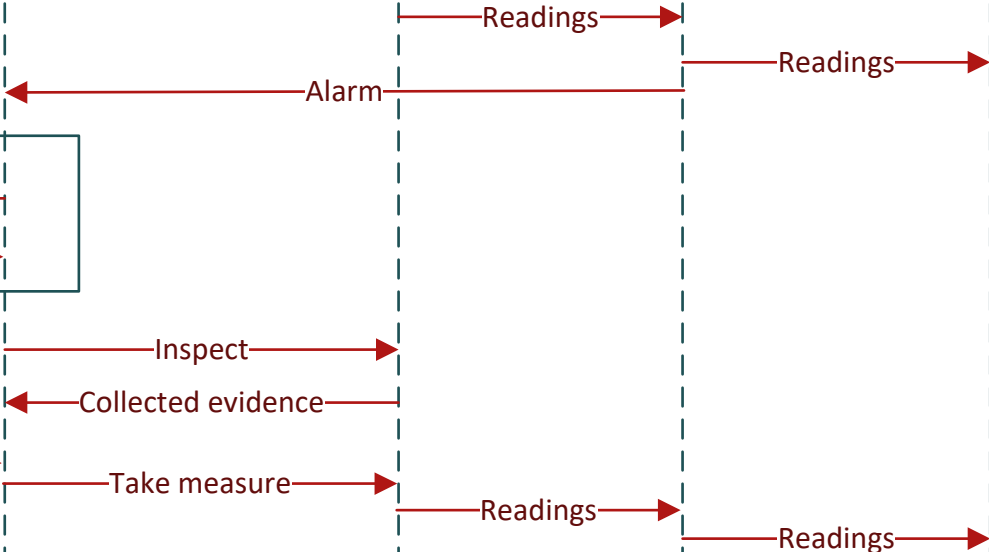
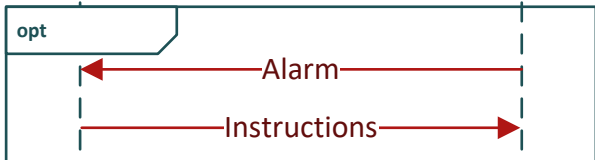
Truck Company

Truck Driver

Shipment

Sensor Unit

Factory



Question 1.f
Attached



sd Driver taking measures

Truck Company

Truck Driver

Shipment

Sensor Unit

Factory

opt

Alarm

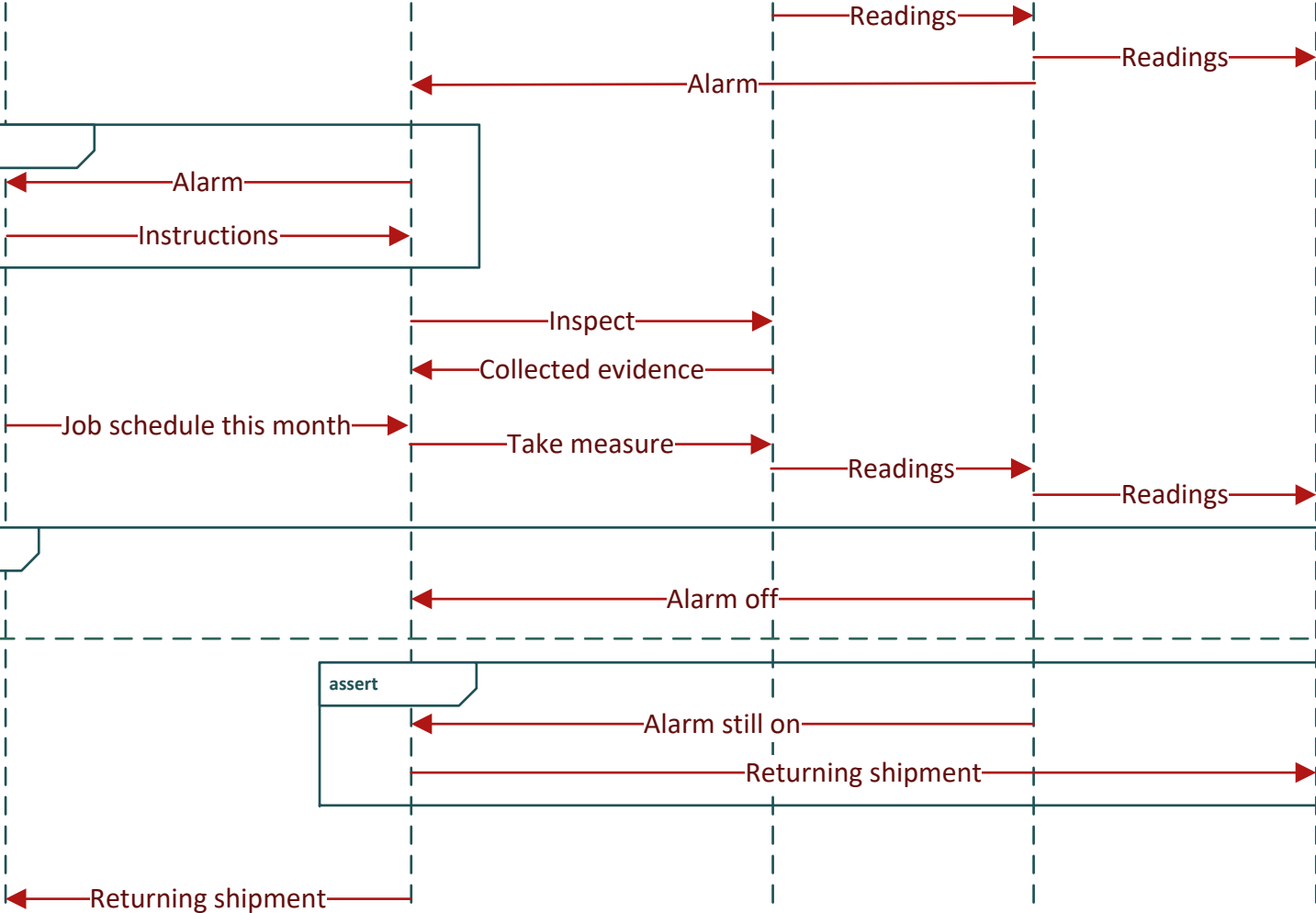
Instructions

xalt

assert

Alarm still on

Returning shipment



Question 2.a
Attached



sd Driver taking measures

Truck Company

Truck Driver

Shipment

Sensor Unit

Factory

opt

Alarm

Instructions

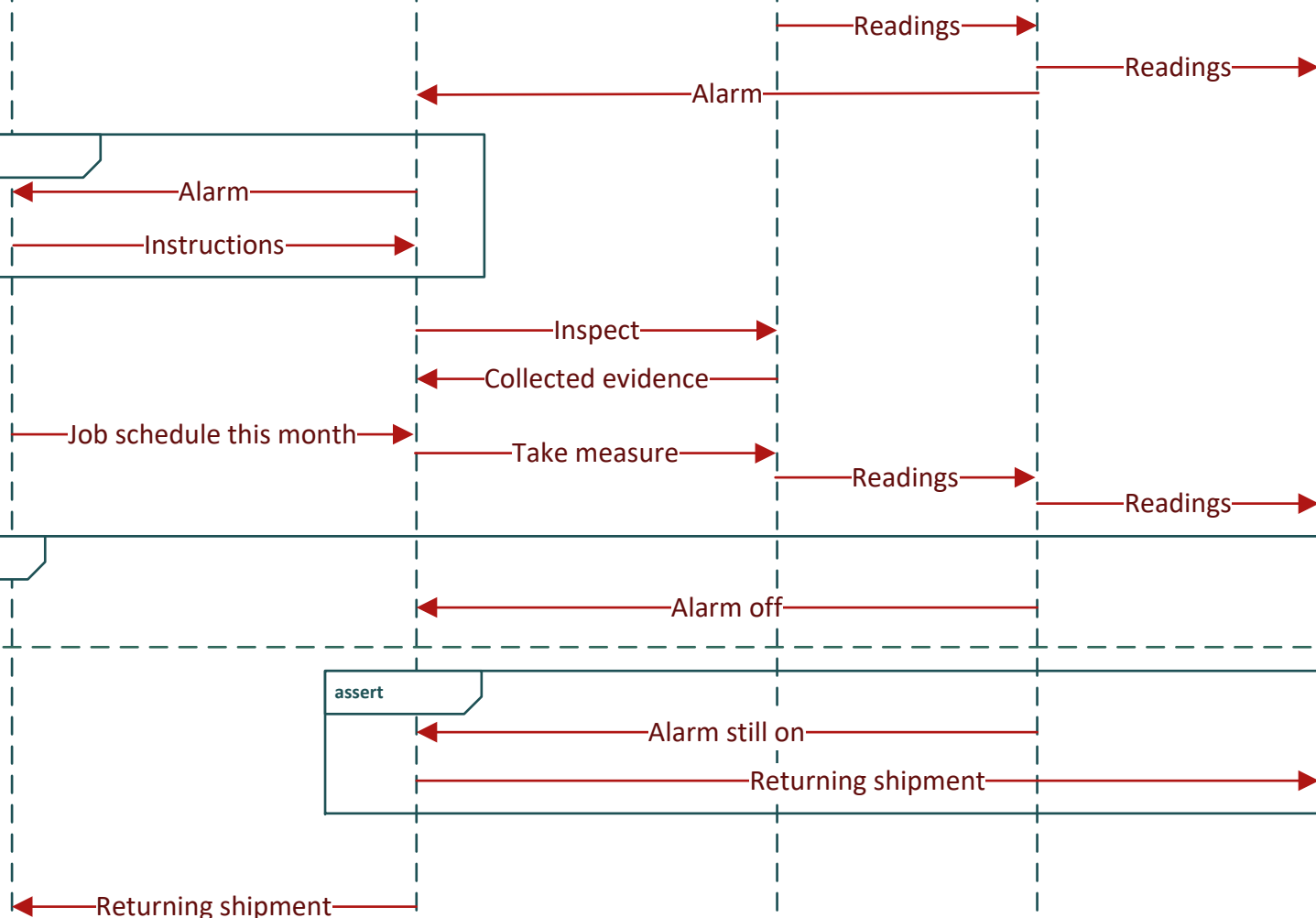
xalt

Alarm off

Alarm still on

Returning shipment

Returning shipment



Question 2.b
Attached



sd Driver taking measures

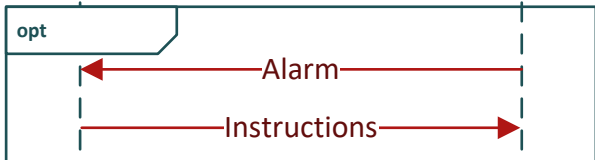
Truck Company

Truck Driver

Shipment

Sensor Unit

Factory



Inspect

Collected evidence

Job schedule this month

Take measure

Readings

Readings

xalt

Alarm off

assert

Alarm still on

Returning shipment

Returning shipment

Readings

Readings

Alarm

Question 2.c
Attached



sd Driver taking measures

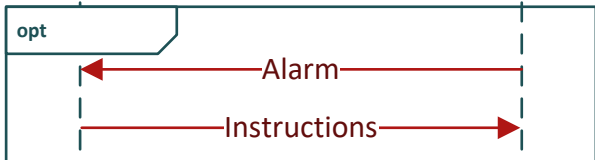
Truck Company

Truck Driver

Shipment

Sensor Unit

Factory



Inspect

Collected evidence

Job schedule this month

Take measure

xalt

Alarm off

Alarm still on

Returning shipment

Returning shipment

Readings

Readings

Alarm

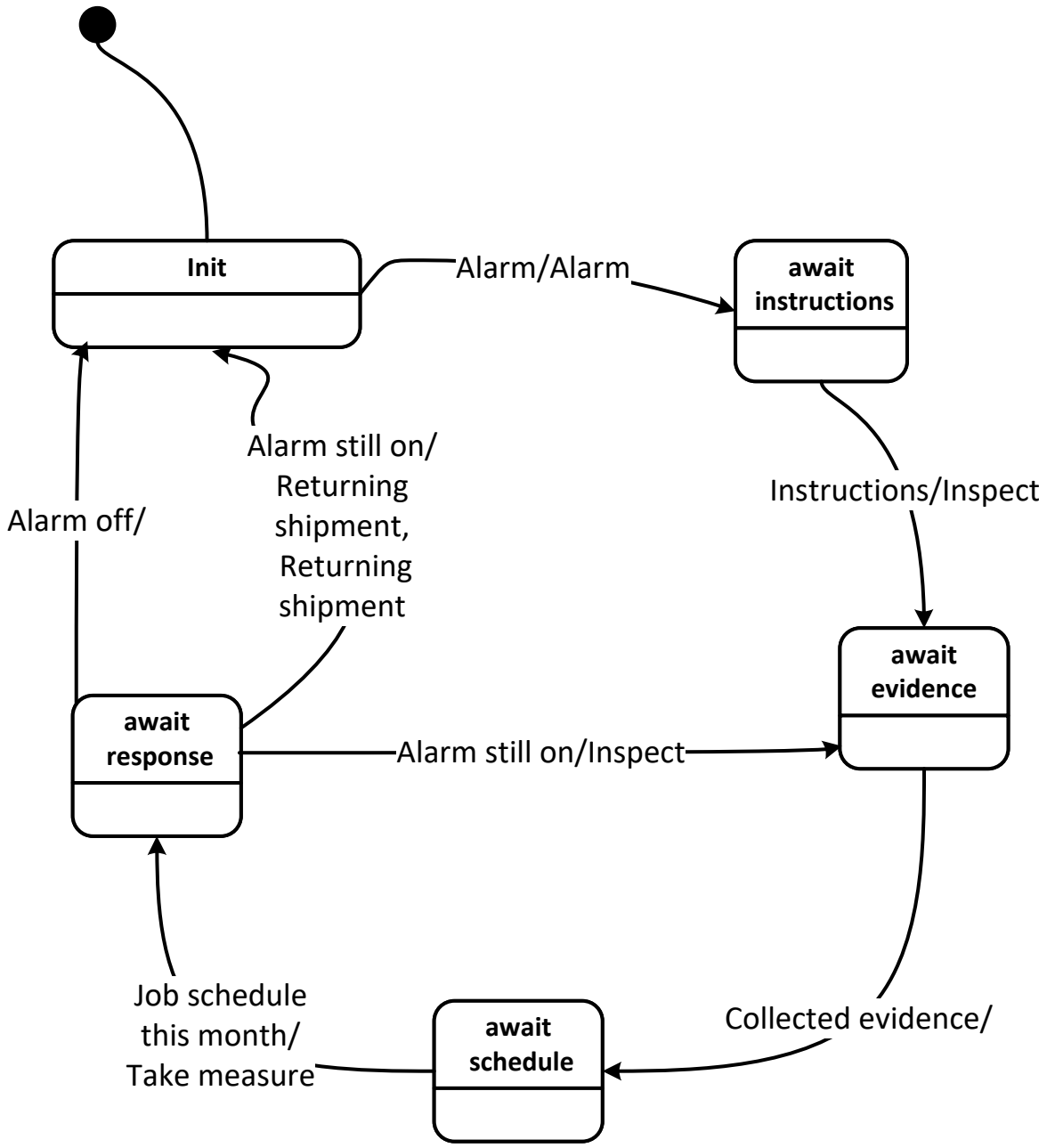
Readings

Readings

Question 2.d
Attached



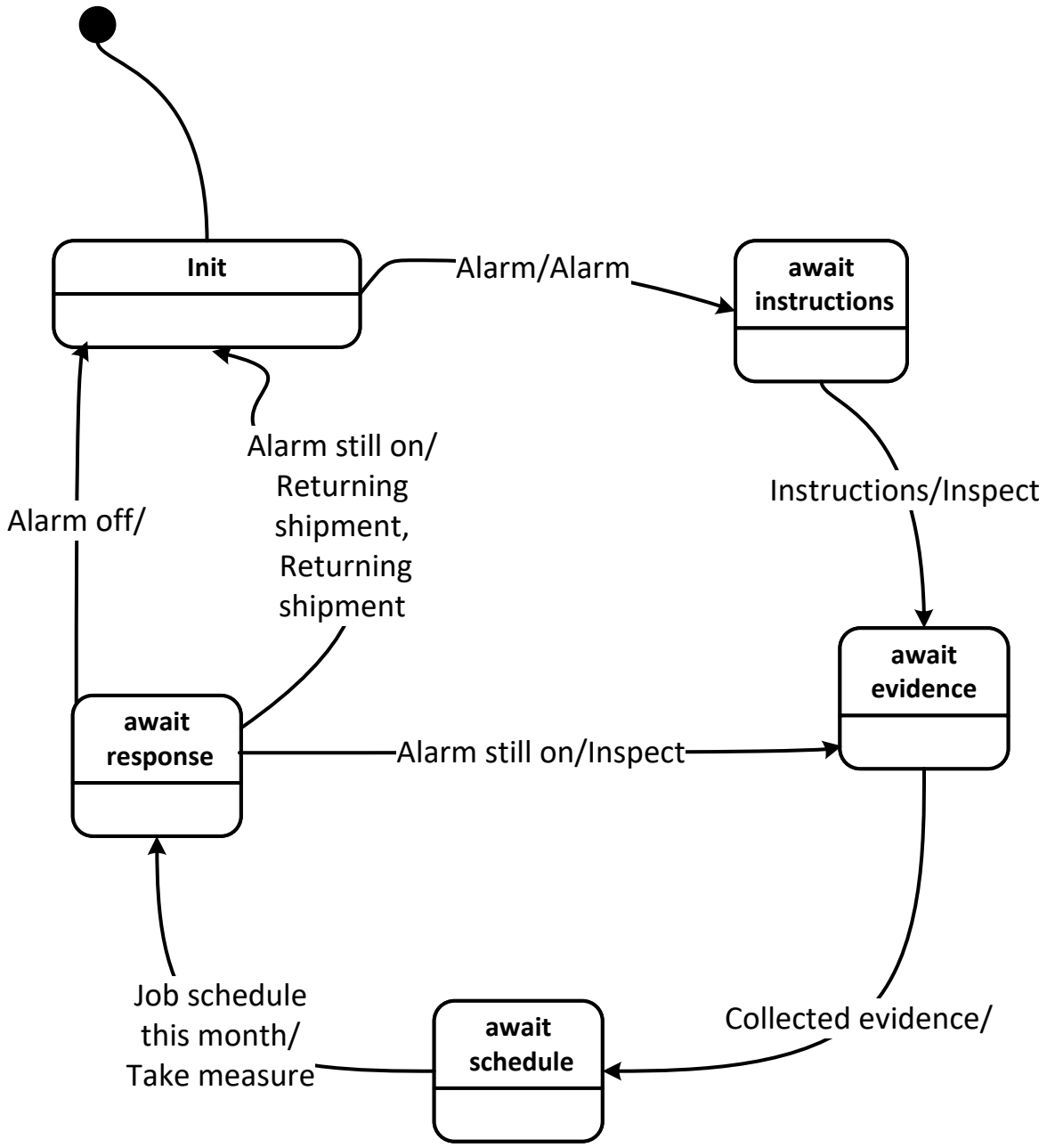
sm Truck Driver



Question 2.e
Attached



sm Truck Driver



Question 2.f
Attached



sd Driver taking measures

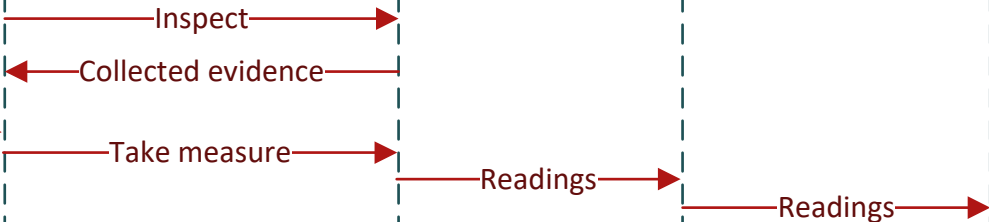
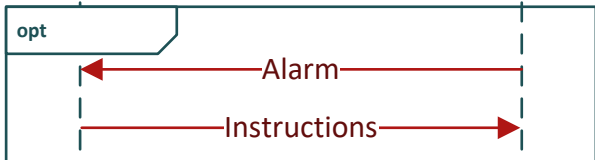
Truck Company

Truck Driver

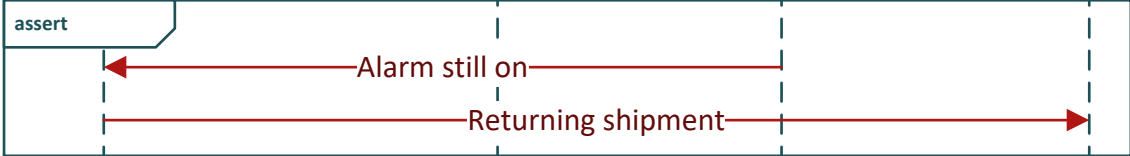
Shipment

Sensor Unit

Factory



xalt



Question 3.b
Attached





Bad guy

10:1y



s
f:1y

15:1y



Angry person

Question 3.c
Attached





Bad guy

10:1y



s
f:1y

15:1y



Angry person

Question 3.d
Attached



