

Concordia University
Department of Computer Science and Software
Engineering
SOEN 331 - S and U
Introduction to Formal Methods
for Software Engineering

Assignment 4 - Solutions
Temporal Logic
Team 19 - Section U

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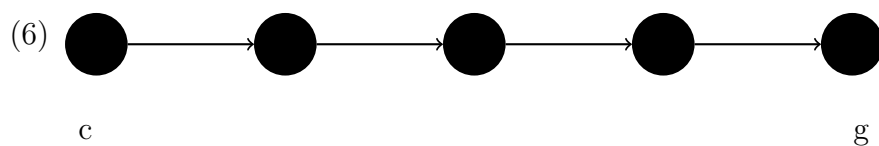
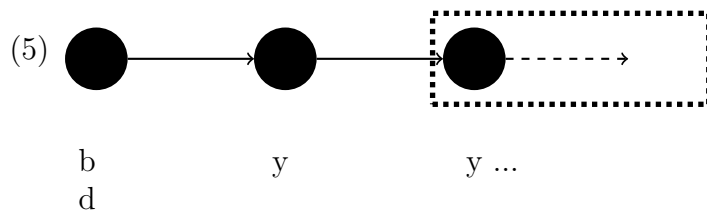
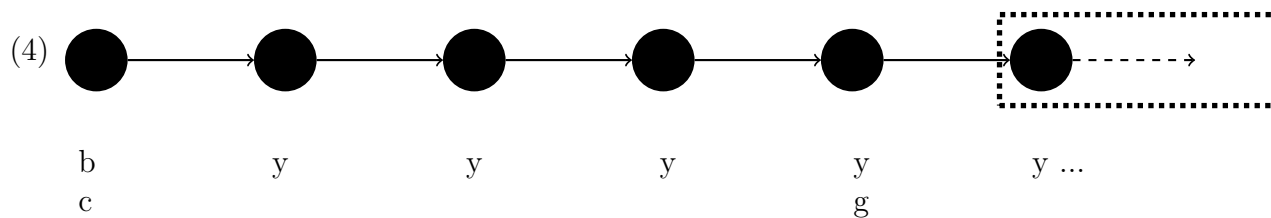
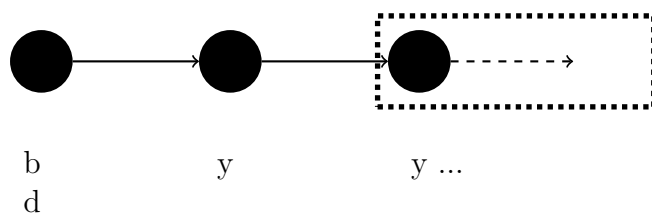
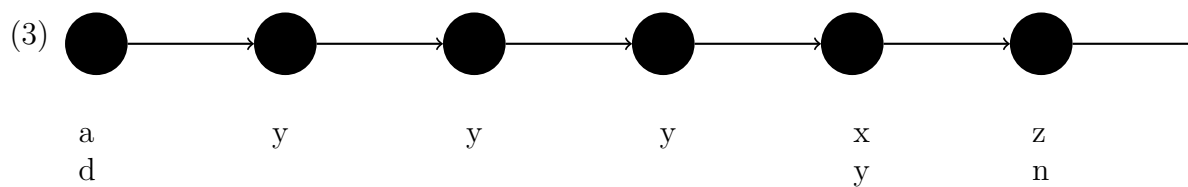
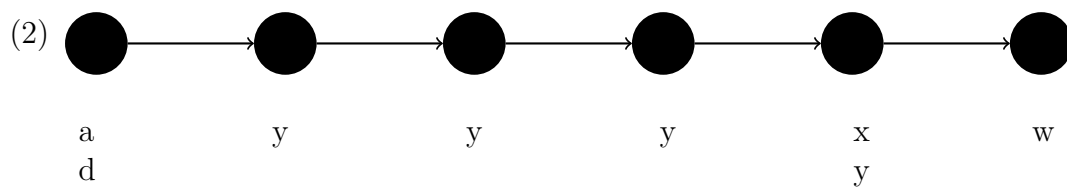
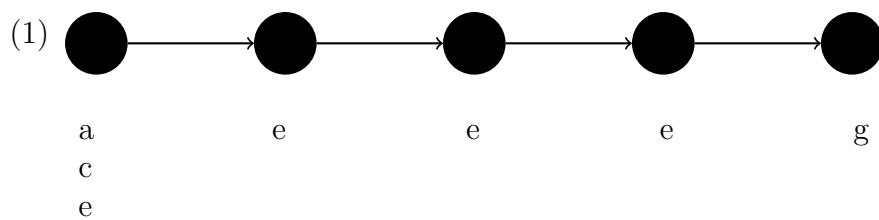
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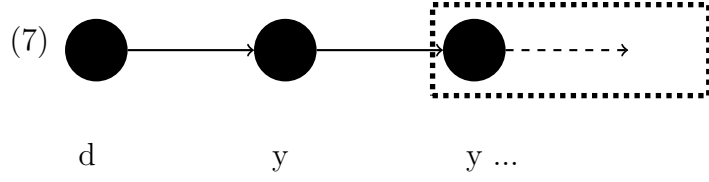
Date: April 19, 2021

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1 Question 1





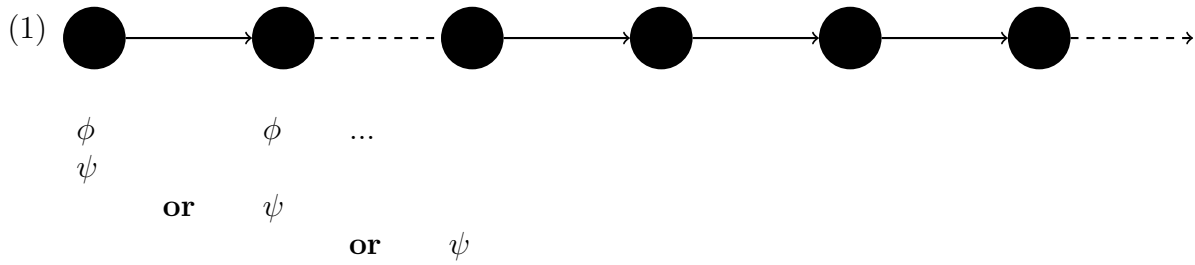
There exists three model's whereby the program terminates, given by the following expressions:

$\langle (a \wedge c \wedge e), e, e, e, g \rangle$

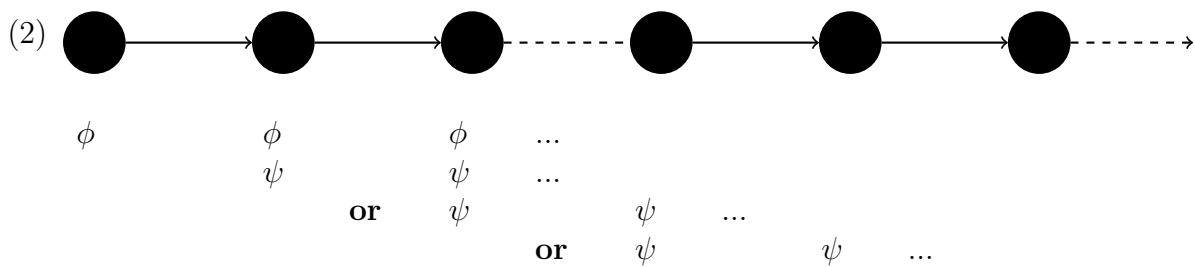
$\langle (a \wedge d), y, y, y, (x \wedge y), w \rangle$

$\langle c, \emptyset, \emptyset, \emptyset, g \rangle$

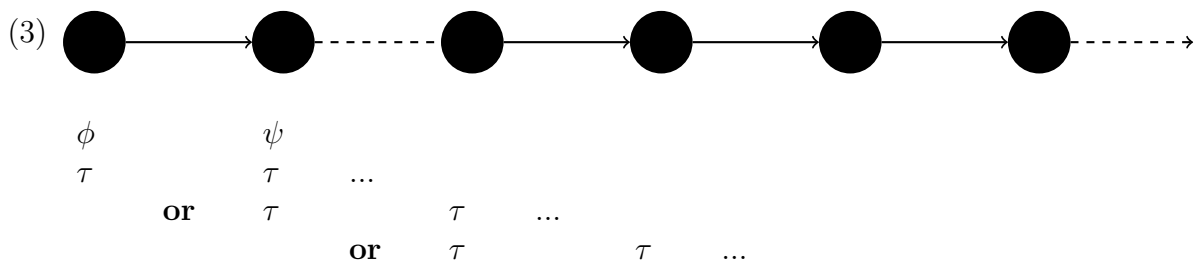
2 Question 2



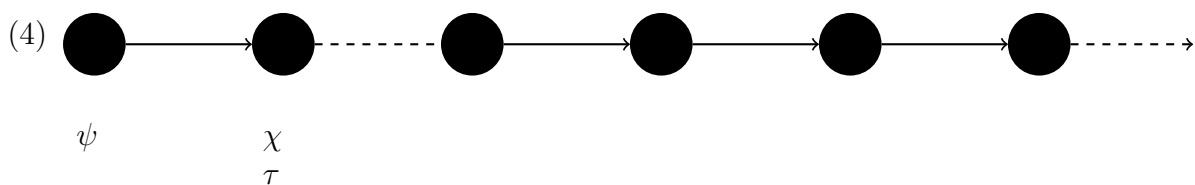
If ϕ is an invariant, then ψ is true in some moment in time.



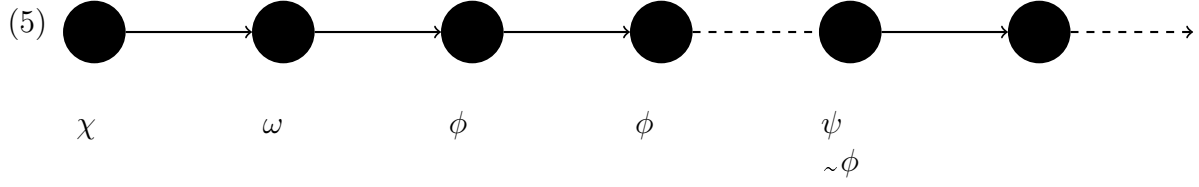
If ϕ is an invariant, then from $i + 1$ onwards, ψ eventually becomes an invariant.



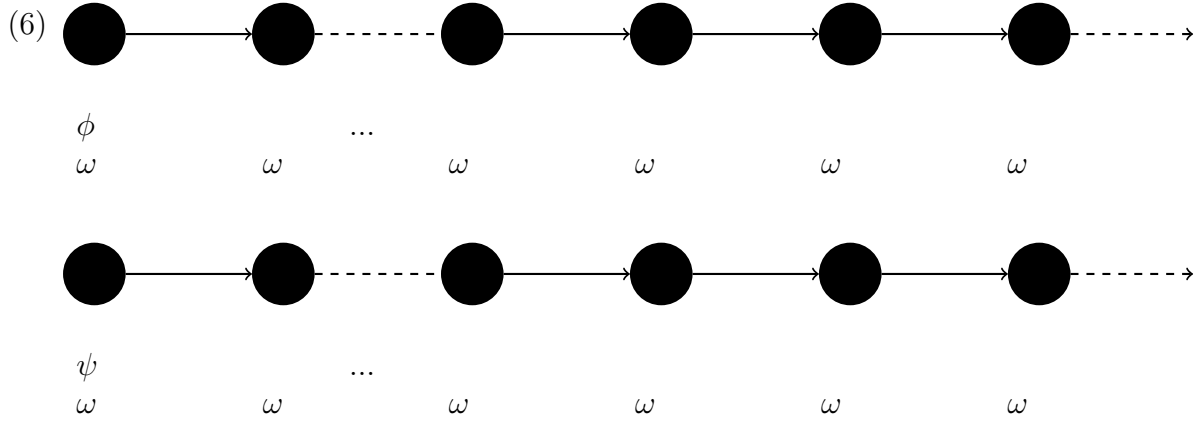
If ϕ is true at i and ψ is true at $i + 1$, then τ can become an invariant anywhere on the path.



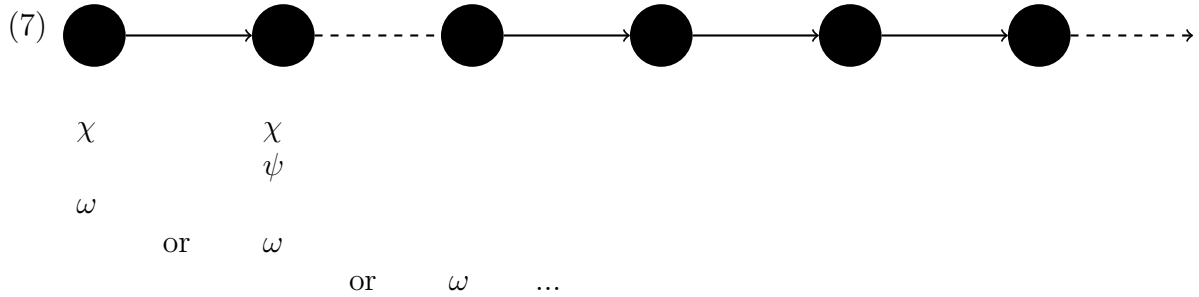
If ψ is true at i and χ is true at $i + 1$, then τ is also true at $i + 1$.



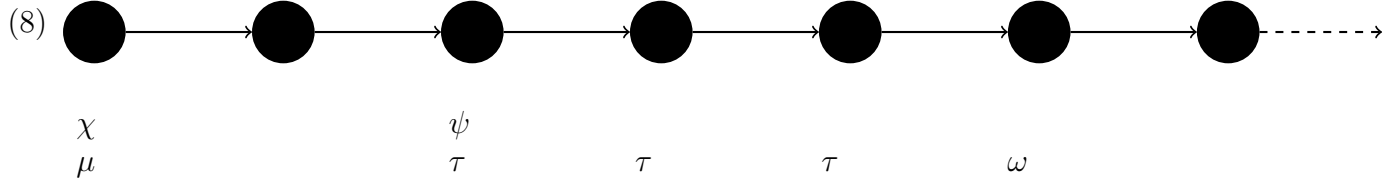
If χ is true at i and ω is true at $i + 1$, then from $i + 2$ onwards, ϕ is true until ψ becomes true.



If only one of the mutually exclusive events ϕ or ψ is true, then ω will always be true.



If χ is true at i and $\chi \ \& \ \psi$ is true at $i + 1$, then ω can emerge anywhere on the path.



If χ is true at i and ψ is true at $i + 2$, then from $i + 2$ onwards, τ is true unless ω becomes true. If μ is true at i , then ω will be true at $i + 5$.