Assignment-6

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

Due on 2018-09-12, 23:59 IST.

1) Which of the following equivalences is wrong for the temporal operators?  
   
   - $AF\phi = \neg EG\neg \phi$
   - $\neg AF\phi = EG\neg \phi$
   - $EF\phi = \neg AF\neg \phi$
   - $\neg EF\phi = AG\neg \phi$

   No, the answer is incorrect.

   Score: 0

   Accepted Answers:
   $EF\phi = \neg AF\neg \phi$

2) Which of the following sets is an adequate set of temporal operators?  
   
   - EX, AU
   - EX, AU, and EU
   - AG, EG, and AF
   - AG and EG

   No, the answer is incorrect.

   Score: 0

   Accepted Answers:
   EX, AU, and EU

3) Which of the following is FALSE about a temporal operators $\phi$ and $p$?  
   
   - $AG\phi$, $EG\phi$, $AF\phi$, and $EF\phi$ can be written in terms of $AU\phi$ and $EU\phi$
   - $AX\phi$ can be written with $EG\phi$
   - $EX\phi$, $EG\phi$ $(AF\phi)$ and $E(\phi U p)$ is an adequate set of operators
   - $AX\phi$ can be written with $EX\phi$

   No, the answer is incorrect.

   Score: 0

   Accepted Answers:
   $EX$, $AU$, and $EU$

4) If the future temporal operator (F) includes the present, then which of the following equivalences is true?  
   
   - $EFp = EX EFp$
   - $EFp = p \land EX EFp$
   - $EFp = p \lor EX EFp$

   No, the answer is incorrect.

   Score: 0

   Accepted Answers:
   $AX\phi$ can be written with $EG\phi$
5) Let $p$ and $q$ are atomic propositions. Which of the following pairs of CTL formulae is not equivalent? 

- $\text{AFp} \lor \text{AFq}$ and $\text{AF}(p \lor q)$
- $\text{AG}(p \land q)$ and $\text{AGp} \land \text{AGq}$
- $\text{T and AGp} \Rightarrow \text{EGp}$
- $\text{EFp} \land \text{EFq}$ and $\text{EF}(p \lor q)$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\text{EFp} \land \text{EFq}$ and $\text{EF}(p \lor q)$

6) Which of the following pairs of CTL formulae is equivalent? 

- $\text{EFp} \land \text{EFq}$ and $\text{EF}(p \land q)$
- $\text{EFp} \lor \text{EFq}$ and $\text{EF}(p \lor q)$
- $\text{EFp}$ and $\text{EGp}$
- $\text{T and EGp} \Rightarrow \text{AGp}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\text{EFp} \lor \text{EFq}$ and $\text{EF}(p \lor q)$

7) What does the CTL model checking algorithm do? 

- Iteratively determines states which satisfy a given CTL formula
- A CTL formula is derived from the states of the model
- Determines the equivalent states of the model
- A model is created using specifications

No, the answer is incorrect.
Score: 0
Accepted Answers:
Iteratively determines states which satisfy a given CTL formula

8) What are the inputs and outputs for the labelling algorithm for model checking? 

- INPUTS = Set of states which satisfy $\phi$ and a CTL Formula $\phi$. OUTPUT = A CTL Model $M = (S, \rightarrow, L)$.
- INPUTS = A CTL Model $M = (S, \rightarrow, L)$ and a Set of states which satisfy $\phi$. OUTPUT = CTL Formula $\phi$.
- INPUTS = A CTL Model $M = (S, \rightarrow, L)$ and a CTL Formula $\phi$. OUTPUT = Set of states which satisfy $\phi$.
- INPUTS = A CTL Model $M = (S, \rightarrow, L)$. OUTPUT = A CTL Formula $\phi$.

No, the answer is incorrect.
Score: 0
Accepted Answers:
INPUTS = A CTL Model $M = (S, \rightarrow, L)$ and a CTL Formula $\phi$. OUTPUT = Set of states which satisfy $\phi$.

9) Which of the following is not a subformula of the CTL Formula $\text{AGp} \land \text{AGq}$? 

- $p$
- $q$
- $\text{AGp}$
- $p \land q$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$p \land q$

10) Which of the following SAT function is FALSE? 

- $\text{SAT}(\phi_1 \lor \phi_2) \Rightarrow \text{SAT}(\phi_1) \lor \text{SAT}(\phi_2)$
- $\text{SAT}(\phi_1 \land \phi_2) \Rightarrow \text{SAT}(\phi_1) \land \text{SAT}(\phi_2)$
- $\text{SAT}(\text{AX} \phi_1) = \text{SAT}(\neg \text{EX} \neg \phi_1)$

No, the answer is incorrect.
Score: 0
11) SAT(\(\varphi_1\)) = SAT(\(\neg E[T \cup \varphi_1]\))

No, the answer is incorrect.
Score: 0
Accepted Answers:
- SAT(\(\varphi_1\)) = SAT(\(\neg E[T \cup \varphi_1]\))

12) SAT\_EX(p) is a function that determines the set of states satisfying EXp. In the given figure, SAT(p) = \{S4, S6\}. What is SAT\_EX(p)?

No, the answer is incorrect.
Score: 0
Accepted Answers:
- \{S1, S3\}
13) Let \( \text{SAT}(p,q) \) be a function that determines the set of states satisfying \( E(p \lor q) \). In the given figure, \( \text{SAT}(p) = \{S1, S2\} \) and \( \text{SAT}(q) = \{S3\} \). Now, what is \( \text{SAT}(p \lor q) \)?

- \( \{S3\} \)
- \( \{S3, S4, S5\} \)
- \( \{S1, S2, S3\} \)
- \( \{S1, S2\} \)

No, the answer is incorrect.
Score: 0
Accepted Answers:
\( \{S1, S2, S3\} \)

14) Let \( p \) be an atomic proposition. Choose the correct one?

- \( AF(p) = E[p \lor p] \)
- \( AF(p) = p \lor AXAF(p) \)
- \( EF(p) = p \lor AXAF(p) \)
- \( AF(p) = p \land AXAF(p) \)

No, the answer is incorrect.
Score: 0
Accepted Answers:
\( AF(p) = p \lor AXAF(p) \)

15) Consider the mutual exclusion example with 4 processes, \( P_1, P_2, P_3, \) and \( P_4 \). The atomic propositions for \( P_i \) are \( n_i, t_i \) and \( c_i \), where \( 1 \leq i \leq 4 \). What is the CTL formula to represent Safety property?

- \( AG \neg((c_1 \land c_2) \lor c_3 \lor c_4) \)
- \( AG \neg((c_1 \land c_3) \lor c_2 \lor c_4) \)
- \( AG \neg((c_2 \land c_3) \lor c_1 \land c_3) \)
- \( AG \neg((c_1 \land c_2 \land c_3 \land c_4) \)

No, the answer is incorrect.
Score: 0
Accepted Answers:
\( AG \neg((c_1 \land c_2 \land c_3 \land c_4) \)

16) Consider the model \( M \) shown in the figure. \( p \) is an atomic proposition. Determine the set of states satisfying \( AXp \) using model checking algorithm, where
Consider the model M shown in the figure. p and q are atomic propositions. Determine the set of states satisfying $E(p U q)$ using model checking algorithm.
Consider the model M shown in the figure. \( p \) and \( q \) are atomic propositions. Determine the set of states satisfying \( AF(\neg p \land q) \) using model checking algorithm.

**No, the answer is incorrect.**  
**Score:** 0  
**Accepted Answers:**  
S1, S4, S5, S6, S7

**1 point**