

Module 1 Graded Quiz

Due Jan 23 at 11:59pm **Points** 10 **Questions** 10
Available after Jan 9 at 11:59am **Time Limit** 300 Minutes

Attempt History

	Attempt	Time	Score
LATEST	<u>Attempt 1</u>	19 minutes	10 out of 10

Score for this quiz: **10** out of 10

Submitted Jan 23 at 8:13pm

This attempt took 19 minutes.

Question 1

1 / 1 pts

Apply unit propagation on the formula

$p \wedge (p \vee q) \wedge (\neg p \vee \neg q) \wedge (q \vee r) \wedge (\neg q \vee \neg r)$ starting with an empty set U of literals. What are the resulting formulas F from the first three iterations?

☐ $F_1 = p \wedge r, F_2 = r, F_3 = T$



$F_1 = q \wedge (q \vee r) \wedge (\neg q \vee \neg r), F_2 = (q \vee r) \wedge (\neg q \vee \neg r), F_3 = T$

☐ $F_1 = \neg q \wedge (q \vee r) \wedge (\neg q \vee \neg r), F_2 = \neg q, F_3 = T$

☒ $F_1 = \neg q \wedge (q \vee r) \wedge (\neg q \vee \neg r), F_2 = r, F_3 = T$

Correct!

Question 2

1 / 1 pts

Apply unit propagation on the formula

$p \wedge (p \vee q) \wedge (\neg p \vee \neg q) \wedge (q \vee r) \wedge (\neg q \vee \neg r)$ starting with an empty set U of literals. What are the resulting set U of literals from the first three iterations?

Correct!

- ☐ $U_1 = \{p\}, U_2 = \{\neg q\}, U_3 = \{r\}$
- ☐ $U_1 = \{p\}, U_2 = \{p, r\}, U_3 = \{p, r, \neg q\}$
- ☒ $U_1 = \{p\}, U_2 = \{p, \neg q\}, U_3 = \{p, \neg q, r\}$
- ☐ $U_1 = \{p\}, U_2 = \{r\}, U_3 = \{\neg q\}$

Question 3

1 / 1 pts

Which option correctly shows how entailment and satisfiability are related?

Correct!

- ☐ $\{p, q\} \models r$ iff $\{r\}$ is satisfiable
- ☐ $\{p, q\} \models r$ iff $\{\neg p, \neg q, r\}$ is unsatisfiable
- ☒ $\{p, q\} \models r$ iff $\{p, q, \neg r\}$ is unsatisfiable
- ☐ $\{p, q\} \models r$ iff $\{p, q, r\}$ is satisfiable

Question 4

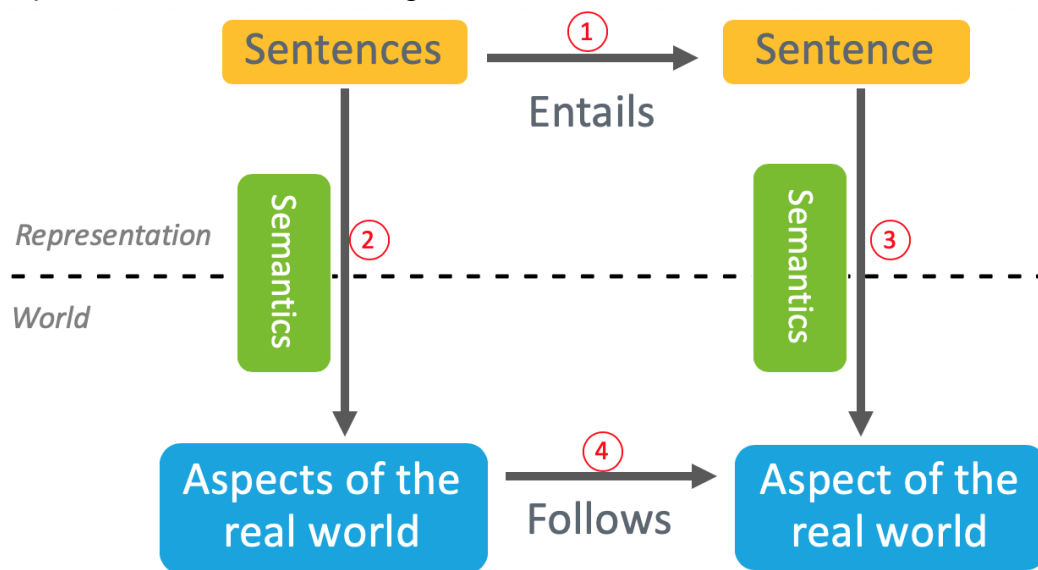
1 / 1 pts

Let F be a propositional formula. Is the following statement true or false?

F is a tautology iff $\neg F$ is satisfiable.

Correct!☐ True☒ False**Question 5****1 / 1 pts**

Consider the following graph where each arrow is denoted by a number in red. Which sequence of arrows best explains the steps for knowledge representation and reasoning?

☐ 4 3 1 2☐ 2 4 1 3☒ 2 1 3 4☐ 2 3 1 4**Correct!****Question 6****1 / 1 pts**

Which option is to have a conclusion that is likely to be true even though we do not have enough evidence?

☐ Abductive reasoning

☐ Model finding

☒ Default reasoning

☐ Deductive reasoning

Correct!

Question 7

1 / 1 pts

Recall the definition of propositional formula below.

A propositional formula of signature σ is defined recursively as follows:

- Every atom is a formula
- Both 0-place connectives are formulas
- If F is a formula then $\neg F$ is a formula
- For any binary connective \odot , if F and G are formulas then $(F \odot G)$ is a formula

Which option is a propositional formula according to the definition?

☒ $a \rightarrow b$

☒ \perp

☐ $(\perp \neg \top)$

☐ $(\neg(a) \vee b)$

Correct!

Correct!

Question 8**1 / 1 pts**

Suppose p is an atom. Is the following statement true or false?

$\{\perp\}$ entails \perp .

Correct!☒ True☐ False**Question 9****1 / 1 pts**

If a propositional signature has n atoms, how many interpretations are there?

☐ $2 * n$ ☐ n ☐ n^2 **Correct!**☒ 2^n **Question 10****1 / 1 pts**

Determine which of the following pairs of formulas are equivalent. (select all that apply)

Correct!☒ $F \rightarrow (G \wedge H)$ and $(F \rightarrow G) \wedge (F \rightarrow H)$

☐ $F \wedge (G \leftrightarrow H)$ and $(F \wedge G) \leftrightarrow (F \wedge H)$

Correct!

☒ $F \vee (G \leftrightarrow H)$ and $(F \vee G) \leftrightarrow (F \vee H)$

Correct!

☒ $(F \wedge G) \wedge H$ and $F \wedge (G \wedge H)$

Correct!

☒ $(F \vee G) \vee H$ and $F \vee (G \vee H)$

Quiz Score: **10** out of 10