

# 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

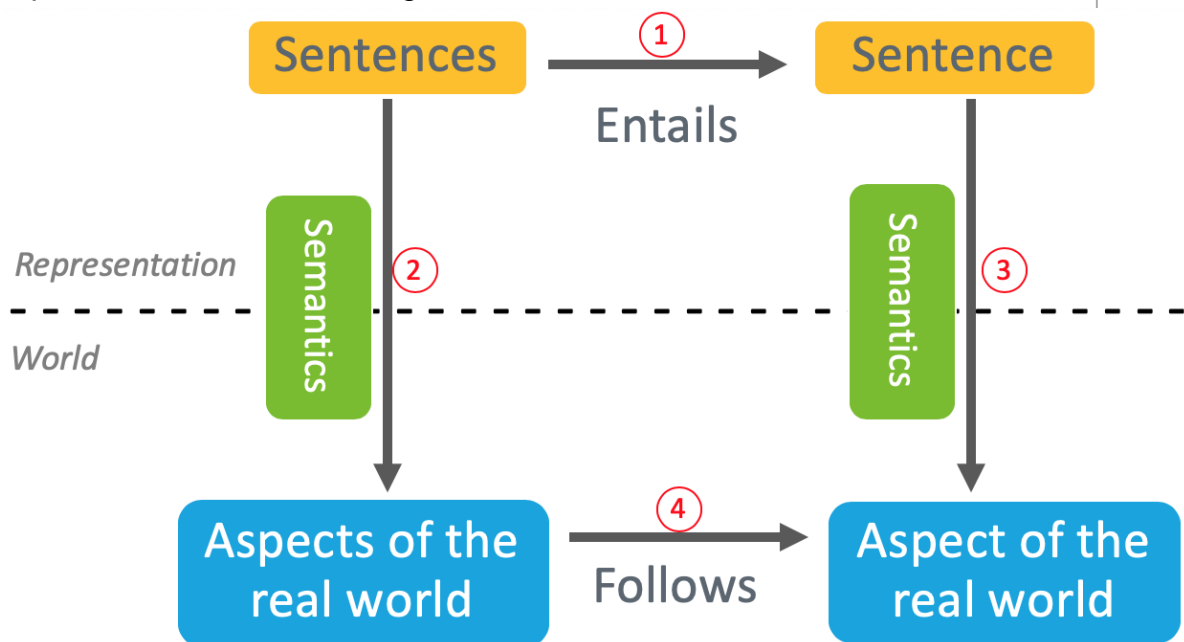
1 / 1 pts

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  $\sigma$  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?

☐  $2 \cdot n$ ☐  $n$ ☐  $n^2$ **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