

# Knowledge Check: First-Order Logic

TOTAL POINTS 4

1. Consider this first-order logic formula:

1 / 1 point

$$\forall x.(\text{Student}(x) \rightarrow \exists y.(\text{Student}(y) \wedge \text{Loves}(x, y)))$$

What does the formula mean?

- ☒ Every student loves some student.
- ☐ There exists a student who loves a student.
- ☐ Every student loves some other student.
- ☐ There exists a student who loves all of the students.



Correct

Correct! This is what the formula means, assuming that Loves(x,y) means "x loves y."

2. Which formula is the correct translation of "Bill takes either Analysis or Geometry (but not both)"?

1 / 1 point

- ☐  $\neg \text{Takes}(\text{Bill}, \text{Geometry}) \vee \text{Takes}(\text{Bill}, \text{Analysis})$
- ☒  $\text{Takes}(\text{Bill}, \text{Analysis}) \leftrightarrow \neg \text{Takes}(\text{Bill}, \text{Geometry})$
- ☐  $\neg \text{Takes}(\text{Bill}, \text{Geometry}) \wedge \text{Takes}(\text{Bill}, \text{Analysis})$
- ☐  $\text{Takes}(\text{Bill}, \text{Analysis}) \wedge \text{Takes}(\text{Bill}, \text{Geometry})$



Correct

Correct! This first-order logic formula represents the equivalence or exclusive-OR.

3. Which set of words provides the vocabulary of first-order logic?

1 / 1 point

- ☐ {Terms=null, Formulas=null, Constants=null, Predicate symbols=null, Function symbols=null}
- ☐ {Variables=null, Terms=null, Formulas=null, Function symbols=null}
- ☐ {Terms=null, Formulas=null, Predicate symbols=null}
- ☒ {Constants=null, Predicate symbols=null, Function symbols=null}

**Correct**

Correct! The vocabulary of first-order logic contains these three components.

**4. Which statement best describes a constraint in first-order logic?**

**1 / 1 point**

- ☐ Quantifiers cannot be used with variables.
- ☒ Quantifiers cannot be used in functions.
- ☐ Formulas cannot be directly connected with logic connectives.
- ☐ A function cannot be recursively used.

**Correct**

Correct! Functions only take terms, which are constants or variables.