



Yashaswi Verma <yashaswi@iitj.ac.in>

Quiz-6 (12-04-2020)

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160

Which of the following would be a predicate in FOL? *

- ☒ IsHappy(Ram)
- ☒ BetternThan(Ram,Shyam)
- ☒ Loves(Ram,MotherOf(Ram))

☐ MotherOf(Ram)

Consider a predicate $P(x)$ with interpretation $x * x \geq x$. For which of the following domains, the truth value of the formula $\forall x P(x)$ will be true? *

- ☐ Real numbers
- ☒ Integers
- ☒ Natural numbers
- ☐ Rational numbers

Which of the following formula(e) is/are satisfiable but not valid? *

- ☒ $\forall x (P(x) \rightarrow Q(x))$
- ☒ $\forall x (P(x) \wedge Q(x))$
- ☐ $\forall x (P(x) \rightarrow P(x))$
- ☒ $\forall x (P(x))$
- ☒ $\forall x (P(x) \vee Q(x))$
- ☒ $\exists x (P(x))$

In the formula $\forall z.(p(z) \rightarrow \exists y.(\exists x.q(x, y, z) \vee q(z, y, x)))$, which of the three variables is/are free? *

- ☒ x
- ☐ y
- ☐ z
- ☐ None

Translate the following into FOL formula: "Every person respects some other person". *

- ☐ $\forall x.(\text{Person}(x) \rightarrow \exists y.(\text{Person}(y) \wedge \text{Respects}(x, y)))$
- ☐ $\forall x.(\text{Person}(x) \rightarrow \exists y.(\text{Person}(y) \rightarrow \text{Respects}(x, y)))$
- ☒ $\forall x.(\text{Person}(x) \rightarrow \exists y.(\text{Person}(y) \wedge \neg(x = y) \wedge \text{Respects}(x, y)))$
- ☐ $\exists x.(\text{Person}(x) \wedge \forall y.(\text{Person}(y) \wedge \neg(x = y) \rightarrow \text{Respects}(y, x)))$

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