(practice QUIZ 3: PREDICATE LOGIC (Un-nested Quantifiers)

MA 240, Instructor: Jeffrey Horn, Fall 2016   NAME:

Match the natural language sentences to their logically equivalent predicate logic expressions below. Next to each sentence write down the NUMBER of the predicate logic expression that you think best matches the sentence. The matching is one-to-one. Let the domain of discourse be the set of all living people. Let "Understands(x,y)" mean " x understands y." Assume "I", and "ME" refer to a unique individual, and that "YOU" also refers to a single individual (different from "I"/"ME").

1 NATURAL LANGUAGE

____ A. No one understands me.

____ B. I understand you.

____ C. I understand everyone.

____ D. To be honest, no one understands you.

____ E. Not everyone understands me.

____ F. If I understand you, then everyone will understand you.

____ G. I don't even understand myself!

____ H. No one truly understands themselves.

____ I. There must be someone who understands me!

____ J. Certainly, if I understand everyone then I will understand you.

2 PREDICATE LOGIC

1. $\overline{Understands(I, ME)}$

2. $\forall x(Understands(I, x))$

3. $\forall x(\overline{Understands(x, x)})$

4. $\exists y(\overline{Understands(y, ME)})$

5. $\forall x(Understands(I, x)) \rightarrow Understands(I, YOU)$

6. $\forall x(\overline{Understands(x, YOU)})$

7. $\forall x(\overline{Understands(x, ME)})$

8. $Understands(I, YOU) \rightarrow \forall(y)(Understands(y, YOU))$

9. $\exists y(Understands(y, ME))$

10. $Understands(I, YOU)$

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QUIZ 3: PREDICATE LOGIC (Un-nested Quantifiers)

MA 240, Instructor: Jeffrey Horn, Fall 2015   NAME: SOLUTION

Match the natural language sentences to their logically equivalent predicate logic expressions below. Next to each sentence write down the NUMBER of the predicate logic expression that you think best matches the sentence. The matching is one-to-one. Let the domain of discourse be the set of all living people. Let "Understands(x,y)" mean " x understands y." Assume "I", and "ME" refer to a unique individual, and that "YOU" also refers to a single individual (different from "I"/"ME").

4 pts each

1 NATURAL LANGUAGE

__7__ A. No one understands me.

__10__ B. I understand you.

__2__ C. I understand everyone.

__6__ D. To be honest, no one understands you.

__4__ E. Not everyone understands me.

__8__ F. If I understand you, then everyone will understand you.

__1__ G. I don't even understand myself!

__3__ H. No one truly understands themselves.

__9__ I. There must be someone who understands me!

__5__ J. Certainly, if I understand everyone then I will understand you.

2 PREDICATE LOGIC

1. $\overline{Understands(I, ME)}$

2. $\forall x(Understands(I, x))$

3. $\forall x(\overline{Understands(x, x)})$

4. $\exists y(\overline{Understands(y, ME)})$

5. $\forall x(Understands(I, x)) \rightarrow Understands(I, YOU)$

6. $\forall x(\overline{Understands(x, YOU)})$

7. $\forall x(\overline{Understands(x, ME)})$

8. $Understands(I, YOU) \rightarrow \forall(y)(Understands(y, YOU))$

9. $\exists y(Understands(y, ME))$

10. $Understands(I, YOU)$

Partial Credit: E.g., $\frac{1}{2}$ credit if you swapped two similar expressions (e.g., you had 5 for F. and 8 for J.)

Note: Some people had expr.#7 for sentence G. Not equivalent, but expr.#7 does imply (is more general than) G! (So partial credit...)