

MATH 170 IDEAS IN MATHEMATICS (SUMMER 2006)

Problem Set 8: More fun with translating everyday life.

Due in class Thursday, June 15th

1. Golfing and corruption

Express the following propositions using PC and the quantifiers \exists and \forall . Let the universe of the quantifiers be “all government officials” and define the following proposition statements

$$S(x) = \text{“}x \text{ is a senator”}$$
$$G(x) = \text{“}x \text{ has played golf”}$$
$$C(x) = \text{“}x \text{ is corrupt”}$$

to help you out. Also, identify which of the propositions are logically equivalent.

- (1) Some senators have played golf and are corrupt.
- (2) Some senators have played golf only if they are corrupt.
- (3) Some senators have played gold if they are corrupt.
- (4) Any senator has played golf that is corrupt.
- (5) Any senator that has played golf is corrupt.
- (6) No senator has played golf unless she’s corrupt.
- (7) Any senator has played golf if he’s corrupt.
- (8) Any senator is corrupt if she’s played golf.
- (9) Any senator has played golf if and only if he’s corrupt.
- (10) Senators who’ve golfed are all corrupt.
- (11) Only corrupt senators have golfed.
- (12) Only senators who’ve golfed are corrupt.
- (13) It’s only senators who’ve golfed if they’re corrupt.
- (14) Some senators have golfed even if they’re not corrupt.
- (15) If a government official is corrupt, then he’s a senator who has played golf.
- (16) Some senators are corrupt and haven’t golfed.
- (17) Some senators are neither corrupt nor have ever golfed.
- (18) No senator who is corrupt has never played golf.
- (19) Any senator has either played golf or is corrupt.
- (20) Some senators are corrupt whether or not they’ve played golf.
- (21) No senator provided he’s never golfed is not corrupt.

2. Ambition

Translate the following paragraph into the language of PC .

If you are ambitious, you will not achieve all your goals. But life has meaning only if you have ambition. Thus, if you achieve all your goals, life has no meaning.

To help you out, define the following propositions:

A = “you are ambitious”

G = “you will achieve all your goals”

M = “life has meaning”

Does the above paragraph make a valid argument?

3. Nuclear Iran

Write the following sentences in the language of PC .

- If the President pursues nuclear research limitations talks with Iran, then, if he gets the foreign policy mechanism working more harmoniously, then the Europeans will acquiesce to the placement of sanctions on Iran.
- But the European’s will never acquiesce to the placement of sanctions on Iran.
- Either the president will not get the foreign policy mechanism working more harmoniously, or he will not pursue nuclear research limitations talks with Iran.

To help you, define the following propositions:

P = “The President pursues nuclear research limitation talks with Iran”

F = “The President gets the foreign policy mechanism working more harmoniously”

E = “The Europeans will acquiesce to the placement of sanctions on Iran”

Finally, can all of these propositions be true at once?