Exercise Class 5
Predicate Calculus

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1. Translate each of the sentences below into a predicate calculus formula, after first identifying the appropriate predicate and constant symbols.

   (For this question, assume that the domain is "animals")

   (a) All white animals are mice
   (b) Basil is a white mouse
   (c) All white mice have tails
   (d) There are no pink mice
   (e) At least one of Basil and Charlie has a tail

2. Translate each of the sentences below into a predicate calculus formula, after first identifying the appropriate predicate and constant symbols.

   (Here, and from now on, you can assume that the domain is "people" unless otherwise stated)

   (a) John loves Mary
   (b) Everybody hates Chris
   (c) Somebody loves Chris
   (d) John loves everybody
   (e) Nobody loves John
   (f) Mary doesn't love anybody and John loves Mary
   (g) Mary hates Chris but Chris loves Mary
   (h) Mary doesn't love everybody or somebody doesn't love Mary
   (i) If Mary loves everybody then somebody doesn't love Mary and Mary loves somebody
   (j) Everyone who loves Mary also loves either Chris or John
   (k) Everyone who loves Chris loves someone who loves John

3. Translate each of the sentences below into a predicate calculus formula, after first identifying the appropriate predicate and constant symbols.

   (a) Everybody loves everybody
   (b) Everybody loves somebody
   (c) Everyone loves themselves
   (d) Everybody loves anybody with red hair
   (e) All Virgos love Leos
   (f) All Virgos love a Capricorn
   (g) No Leo loves a Capricorn

4. Translate these arguments into the predicate calculus and explain whether or not they are valid.

   (a) Everybody has a mother therefore somebody is the mother of everyone.

   (b) Everybody who loves everybody loves themself.