

Exercises to 3.3 *The advantages of predicate logic*

(1) *Symbolize the following sentences using the given notations.*

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| 1) Any mineral with a hardness above 8 is precious. | F – ...is a mineral, G – ...has a hardness above 8, H – ...is precious |
| 2) Not all poor people are unhappy. | F – ...is poor, G – ...is human, H – ...is unhappy |
| 3) Bob borrowed a book from Alice but has not returned it to her. | F – ...is a book, G – ...borrowed...from..., H – ...has returned...to..., b – Bob, a – Alice |
| 4) Expensive stones either have a high hardness or are rare. | F – ...is expensive, G – ...is a stone, H – ...has a high hardness, I – ...is rare |
| 5) Someone has hit or insulted Mary's brother. | F – ...has hit..., G – ...has insulted..., a – Mary's brother; D – the set of humans |
| 6) Bob is the author of a book that sells well. | F – ...is the author of..., G – ...is a book, H – ...sells well, b – Bob |
| 7) Bob has a beautiful wife, but she hates him. | F – ...is married to..., G – ...is beautiful, H – ...hates..., b – Bob; D – the set of humans |
| 8) Alice did not introduce Bob to all of her friends. | F – ...introduced...to..., G – ...is a friend of..., a – Alice, b – Bob |
| 9) Alice did not introduce Bob to any of her friends. | (as above) |
| 10) Animals that prowl at night always love to gaze at the moon. | F – ...is an animal, G – ...prowls at night, H – ...always love to gaze at..., a – the moon |
| 11) Every animal is suitable for a pet, that loves to gaze at the moon. | F – ...is an animal, G – ...is suitable for a pet, H – ...loves to gaze at..., a – the moon |
| 12) I detest animals that that do not take to me. | F – ...is an animal, G – ...detests..., H – ...takes to..., a – I |
| 13) The only animals in this house are cats. | F – ...is an animal, G – ...is a cat, H – ...is in..., a – this house |
| 14) No animals ever take to me, except what are in this house. | F – ...is an animal, G – ...takes to me, H – ...is in..., a – this house |
| 15) No animals are carnivorous, unless they prowl at night. | F – ...is an animal, G – ...is carnivorous, H – ...prowls at night |
| 16) Bob gave a book to each of his friends. | F – ...gave...to..., G – ...is a book, H – ...is a friend of..., b – Bob |

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- 17) All human heads are animal heads. F – ...is the head of..., G – ...is human, H – ...is an animal
- 18) Everything is greater than something. F – ...is greater than...
- 19) There is something than which everything is greater. (as above)
- 20) Everyone likes someone who likes Socrates. F – ...likes..., a – Socrates; D – the set of humans
- 21) There is someone who likes everyone who does not like themselves. (as above)
- 22) Nobody likes someone who doesn't like anyone. (as above)
- 23) There are books that all readers like. F – ...is a book, G – ...is a reader, H – ...likes...

(2) *In the previous exercise, the following examples had to be symbolized by limiting the universe of discourse D . Symbolize them now without limiting D .*

- 1) Someone has hit or insulted Mary's brother. F – ...has hit..., G – ...has insulted..., H – ...is human, a – Mary's brother
- 2) Bob has a beautiful wife, but she hates him. F – ...is married to..., G – ...is beautiful, H – ...hates..., I – ...is human, b – Bob
- 3) Everyone likes someone who likes Socrates. F – ...likes..., G – ...is human, a – Socrates
- 4) There is someone who likes everyone who does not like themselves. (as above)
- 5) Nobody likes someone who doesn't like anyone. (as above)