

Math 557 – Homework #5

September 13, 2000

Exercises in writing formulas of predicate calculus.

1. Assume the following predicates:

Hx : x is a human

Cx : x is a car

Tx : x is a truck

Dxy : x drives y

Write formulas representing the obvious assumptions: no human is a car, no car is a truck, humans exist, cars exist, only humans drive, only cars and trucks are driven, etc.

2. Write formulas representing the following statements:

(a) Everybody drives a car or a truck.

(b) Some people drive both.

(c) Some people don't drive either.

(d) Nobody drives both.

3. Assume in addition the following predicate:

Ixy : x is identical to y

Write formulas representing the following statements:

(a) Every car has at most one driver.

(b) Every truck has exactly two drivers.

(c) Everybody drives exactly one vehicle (car or truck).

4. Assume the following predicates:

Ixy : $x = y$

$Pxyz$: $x \cdot y = z$

Write formulas representing the axioms for a group: axioms for equality, existence and uniqueness of products, associative law, existence of an identity element, existence of inverses.