

1A SRP WORKSHEET 1

NAME:

CLASS:

TUTOR:

5 Very good

4 Good

3 Satisfactory

2 Weak

1 Very weak

Reading

Papineau, *Philosophical Devices* Part I ch. 1

Steinhart, *More Precisely* Ch. 1, 2.

UNDERSTAND:

DON'T UNDERSTAND:

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SECTION A

Define: union, intersection, subsethood, power set and Cartesian product. Let C and D be the sets of all cats and all dogs. Let Rxy be the relation x is bigger than y and let f denote Fido, who is a dog.

$$X \cup Y = \{x \mid x \in X \vee x \in Y\}$$

$$X \cap Y = \{x \mid x \in X \wedge x \in Y\}$$

$$X \subseteq Y \leftrightarrow \forall x (x \in X \rightarrow x \in Y)$$

$$\wp(X) = \{Y \mid Y \subseteq X\}$$

$$X \times Y = \{(x, y) \mid x \in X \wedge y \in Y\}$$

(a) Use set-theoretic notation to write down expressions for the following sets:

1. The set of all animals that are cats or dogs **C U D**
2. The set of all cats smaller than Fido **{x|Rfx & Cx}**
3. The set of all sets of dogs smaller than Fido **{x|Rfx & Dx}**
4. The set of all dogs smaller than every cat **D ∩ {x | ∀z (z ∈ C → Rzx)}**
5. The set of all cat-dog mixed pairs (e.g. in a chess competition) **D X C**
6. The set of all possible mixed pairs involving Fido **C X {f}**
7. The set of all possible mixed pairs not involving Fido **C X (D-{f})**

(b) What are the members of $\wp(\wp(\emptyset))$? $\emptyset, \{\emptyset\}$

*(c) True or false? $\wp(X) = \wp(Y)$ iff $X = Y$. Say briefly why.

*(d) Write down the axiom of extensionality. Say briefly why it follows from the axiom that at most one set is empty.

SECTION B

Say which of the following relations are symmetric, transitive, or reflexive over some domain of people in which siblings share both parents and which contains both Jane Austen (*Persuasion*) and Sir Walter Scott (*Waverley*).

1. Most people prefer x to y **¬R, ¬S, ¬T (Condorcet)**
2. x and y are distinct siblings **¬R, S, ¬T**
3. x is a brother of y **¬R, ¬S, ¬T**
4. x and y are both alive and x is at least one year older than y
5. x and y are both alive and x is at least 150 years older than y
6. x and y were once married
7. x wrote *Waverley* iff y wrote *Persuasion*