1. Mark each of the following as true or false.

{a, b, c} ⊂ {a, b, {c}}

c ⊂ {c}

c ∈ {c}

∅ ∈ {c}

∅ ⊂ {c}

1. One of the sets listed below is a subset of another. Which is a subset of which?

A = {n : n is a prime integer and n > 2}

B = {n : n is an integer and 1 ≤ n ≤ 20}

C = {1, 3, 5, 7, 9, . . .}

3. Find the power set of {7, 11, 13}.

4. Given the universal set U = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}, and given

A = {1, 3, 7, 8, 9}

B = {2, 3, 6, 7, 10}

C = {1, 5, 6, 8}

list the elements in the following sets.

• A ∩ C

• B’

• A’ ∩ B’

5. Prove that if A, B, C are any sets, then A ∩ (B ∪ C) = (A ∩ B) ∪ (A ∩ C).

6. Given the sets

A = {n : : n = 4u for some positive integer u}

B = {n : : n = 3v + 1 for some positive integer v}

list the six smallest elements of A ∩ B. 3

7. Construct a truth table for ∼p ∨ ∼(q ∧ ∼r).

8. Show that the statement is a tautology. ((p ↔ q) ∧ ∼p) → ∼q 4

9. Show that the statement is a tautology. (p ∧ q) → (p ∨ ∼q)

10. Show that the statement is a contradiction. p ∧ (q ∧ ∼p) 5

11. Prove the following. (p → q) ≡ (∼p ∨ q)

12. Determine whether the following is a valid argument. (p → ∼q), (∼r → p), q ` r 6

13. Translate the following argument into symbols. Is it a valid argument?

Premise 1: A dog does not bark a lot if and only if he is friendly.

Premise 2: A chihuahua barks a lot.

Premise 3: My dog is friendly.

Conclusion: My dog is not a chihuahua.

14. Express each of the following using predicates and quantifiers.

• All people who are comedians are funny.

• All people are comedians and are funny.

• Some people who are comedians are funny.

• Some people who are comedians are not funny