Math 300 **Fall 2024**

Lab Assignment #17

This lab is due at 12:30 PM on Wednesday, 11/6 and is worth 10 points. This part may be done individually, or in a group of 2, 3, or 4 people.

1) Set A = {Jilly Boo, Hoagie, Nibbler, Skippy, Claüdia}
For short, you can write A = {j, h, n, s, c}.
a) How many elements does the power set of A have?
b) How many subsets of A have exactly 1 element?
c) How many subsets of A have exactly 2 elements?
d) How many subsets of A have exactly 3 elements?
e) How many subsets of A have exactly 4 elements?
f) How many subsets of A have exactly 5 elements?
g) What is the sum of your answers to parts (b)-(f)? Is this equal to the number in (a)? What's going on?
h) Write the power set of A.

2) Start with the empty set.
a) How many elements are in the empty set?
b) How many different subsets are there of the empty set?
c) What is the power set of the empty set? Call this set B.
d) How many elements are in B?
e) How many different subsets are there of B?
f) What is the power set of B? Call this set C.
g) How many elements are in C?
h) How many different subsets are there of C?
i) What is the power set of C? Call this set D.
j) Repeat until the end of time.
k) Actually don't.
l) Extra credit: repeat one more iteration and get the power set of D.

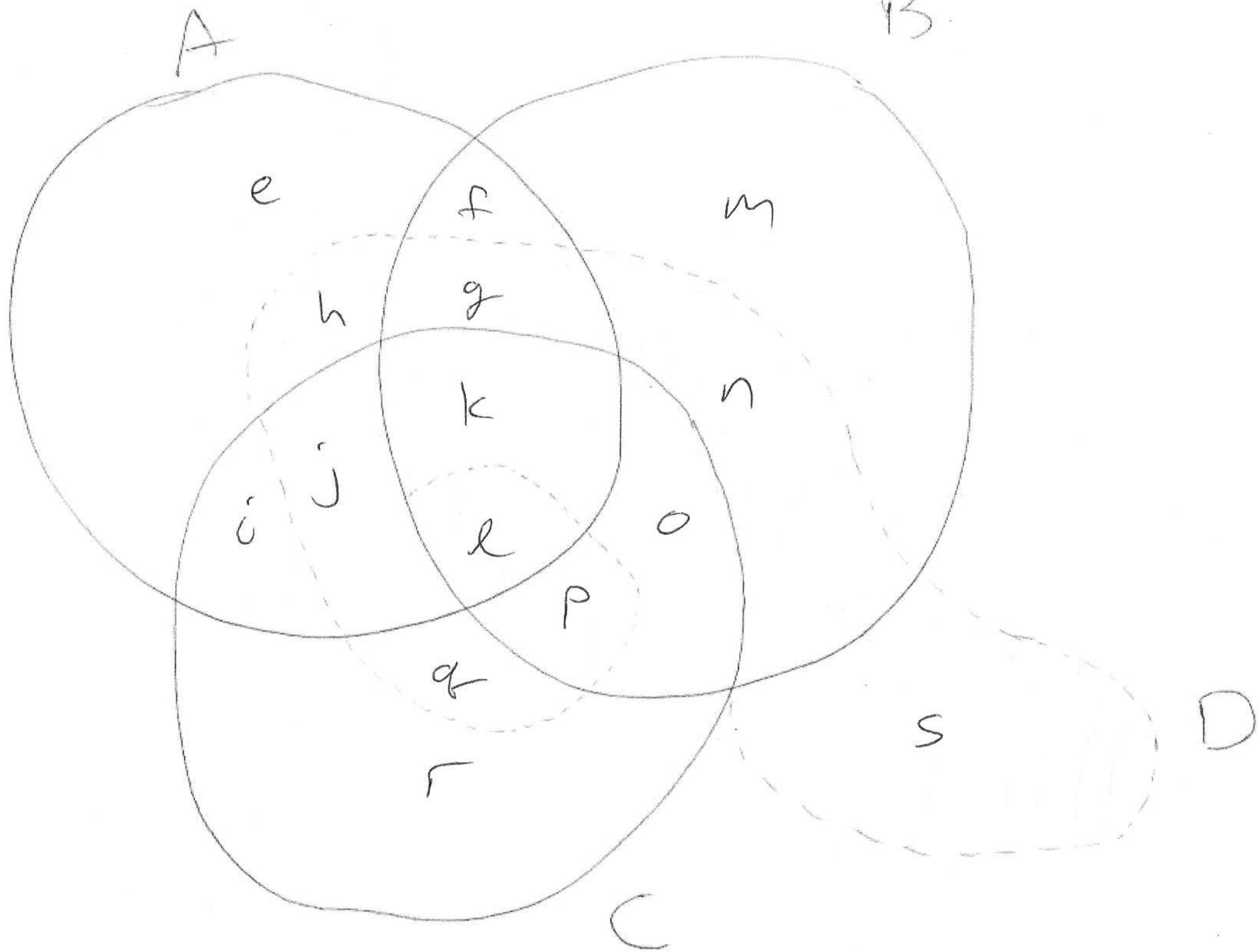
3) Prove the inclusion-exclusion principle for 4 sets. See picture on next page.

$n(A \cup B \cup C \cup D) = n(A) + n(B) + n(C) + n(D)\ldots$

$- n(A \cap B) - n(A \cap C) - n(A \cap D) - n(B \cap C) - n(B \cap D) - n(C \cap D)\ \ldots$

$+ n(A \cap B \cap C) + n(A \cap B \cap D) + n(A \cap C \cap D) + n(B \cap C \cap D)\ \ldots$

$- n(A \cap B \cap C \cap D)$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