## Name:

Please write your solutions in an organized and systematic manner; use scratch paper to solve the problems first and then write up a neat solution with the relevant work shown.

1. Consider the following sets

$$A = \{-1, 1, 2\}$$

$$B = \emptyset$$

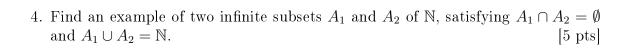
$$C = \{x \in \mathbb{Z}; x^4 - 5x^2 + 4 = 0\}$$

$$D = \{x \in \mathbb{N}; \cos(x) = 0\}$$

- (a) Which of these four sets are equal?
- (b) What is the cardinality of C?
- (c) Find two sets among these such that one will be a proper subset of the other.
- (d) Find  $A \cup C$  and  $A \cap C$ .
- (e) Find  $A \cap B$ .

- 2. Give an example of three sets A, B and C such that  $B \neq C$  but  $B \setminus A = C \setminus A$ .
  - [5 pts]

3. Give an example of four different subsets A, B, C and D of  $\{1, 2, 3, 4\}$  such that all 6 intersections of two of them (i.e.  $A \cap B$ ,  $A \cap C$ ,  $A \cap D$ ,  $B \cap C$ , etc.) will be distinct. [5 pts]



5. Compute  $\mathcal{P}(\{1,2,4\})$ .

6. (extra credit) [5 pts]

Let A,B and C be sets. "Prove" (i.e. convince me) that if  $A\subseteq B$  and  $B\subseteq C$  then  $A\subseteq C.$