

## TEST 2

(Math 258 A)

1. (i) Let  $A = \{a, b, c, d, e, f\}$  and  $B = \{p, d, k, f\}$ . Find: (40 pts)

(a)  $A \cup B$

(b)  $A \cap B$

(c)  $A - B$

(d)  $B - A$

(ii) Let  $A = \{1, 2, 3\}$  and  $B = \{a, b\}$ . Find:

(a)  $P(A)$

(b)  $A \times B$

(iii) Let  $A = \{\emptyset, \{\emptyset\}\}$ . Find:

(a)  $P(A)$

(b)  $P(P(A))$

2. Determine which of the following sets is the power set of a set. For the ones that are power sets, write down the set. (10 pts)

(a)  $\{\emptyset, \{a\}\}$

(b)  $\{\emptyset, \{a\}, \{\emptyset, a\}\}$

3. Show that if  $A \subseteq B$ , then  $A \cap B = A$ . (10 pts)

4. Show that if  $A \subseteq B$ , then  $\mathcal{P}(A) \subseteq \mathcal{P}(B)$ . (10 pts)

5. Show that for any sets  $A$  and  $B$ , we have  $A - B = A \cap \overline{B}$ . (10 pts)

6. The **symmetric difference** of two sets  $A$  and  $B$ , denoted by  $A \oplus B$ , is the set containing those elements that belong to either  $A$  or  $B$ , but not in both. Answer the following: (20 pts)

(a) Show that  $A \oplus \emptyset = A$       (b) If  $A \oplus B = A$ , what can you say about  $B$ ? Explain.