

ECONOMICS 207
SPRING 2008
LABORATORY EXERCISE 1

Problem 1. Consider the following six sets.

$$A = \{1, 2, 4\}$$

$$B = \{2, 3, 5\}$$

$$C = \{1, 2, 3, 4\}$$

$$D = \{2, 3, 4, 5, 6\}$$

$$E = \{2, 3, 4, 5, 6\}$$

$$F = \{0, 1, 2, 4, 5, 7\}$$

$$U = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$$

a. A is a subset of which other sets?

b. What is $A \cap B$?

c. What is $C \cap F$?

d. What is $A \cap B \cap C$?

e. What is $A \cup (B \cap D)$?

f. What is $(A \cup B) \cap D$?

g. What is $(A \cup B) \cap (A \cup D)$?

h. What is $A \cap (B \cup D)$?

i. What is $(A \cap B) \cup (A \cap D)$?

j. What is $(A \cap B) \cup D$?

k. What is $(A \cup D) \cap (B \cup D)$?

l. What is $(A \cap D) \cup (B \cap D)$?

m. Given U , what is A^C ?

n. Given U , what is $(A \cup B)^C$?

o. Given U , what is $(A \cap B)^C$?

p. What is $D \setminus E$?

q. What is $F \setminus A$?

Problem 2. Consider the following sets.

$$A = \left\{ \frac{a}{b} : a \in \{0, 1, 2, 3, 4\}, -1 \leq b \leq 3 \text{ and } b \in \text{integers}, b \neq 0 \right\}$$

$$B = \{ \{x, y\} : x + y = 5, x < 3 \text{ and } x \in \text{natural numbers}, y \leq 7 \}$$

$$C = \{ \{x, y\} : x + y = 5, x < 10 \text{ and } x \in \text{natural numbers}, y \leq 7 \text{ and } y \in \text{integers} \}$$

$$D = \{ \{x, y\} : x + 2y = 12, x < 10 \text{ and } x \in \text{natural numbers}, y \leq 7 \text{ and } y \in \text{integers} \}$$

$$E = \{ \{x, y\} : x + 2y = 12, x < 8 \text{ and } x \in \text{integers}, y \leq 7 \}$$

$$F = \{ \{x, y\} : 4x + y = -1, x < 2 \text{ and } x \in \text{integers}, y \leq 7 \}$$

$$G = \{ \{x, y\} : x + y = 5, x < 2 \text{ and } x \in \text{integers}, y \leq 7 \}$$

$$X = \{ \{x, y\} : |x| < 10, |y| < 5 \}$$

- a. List or show the elements of each of the sets: A, B, C, D, E, F, G, and X.
Hints: For set A, first find acceptable numbers for b.
For sets B, C, D, E, F and G, the set will be composed of ordered pairs (x, y).

b. What is $A \cap B$?

c. What is $B \cap C$?

d. What is $B \cap D$?

e. What is $B \cap E$?

f. What is $E \cap F$?

g. What is $E \cap G$?

h. What is $E \cap F \cap G$?

Problem 3. Simplify the following fractions.

a. $\frac{16}{20}$

b. $\frac{112}{77}$

c. $\frac{441}{189}$

d. $\frac{4158}{2160}$

e. $\frac{426888}{27720}$

f. $\frac{15015}{35343}$

Problem 4. Complete the following operations.

a. $\frac{14}{16} + \frac{1}{4}$

b. $\frac{\frac{112}{77}}{\frac{6}{7}}$

c. $\frac{15}{28} + \frac{3}{7}$

d. $\frac{17}{26} + \frac{7}{4}$

e. $\frac{6}{7} + \frac{33}{84} + \frac{5}{6}$

f. $\frac{7}{8} + \frac{11}{24} + \frac{1}{3} + \frac{7}{12}$