

## Lab for Section 2.1

Use good notation and show appropriate work. Write explanations in **complete sentences**.

- State why each description of a set is **not** well-defined, then rewrite each to describe a well-defined set.
  - the set of all phone numbers listed in the MSUM/NDSU phone directory
  
  
  
  
  
  
  
  
  
  
  - the set of rich people who own a house in the city of Moorhead
  
- In the town of Mathville, the barber shaves everyone except those who shave themselves. Consider the collection of people in Mathville that are shaved by the barber. Is the set well-defined?
  
  
  
  
  
  
  
  
  
  
- Identify whether each set is infinite or finite.
  - $\{x : x \text{ is an atom of gold on the planet earth.}\}$
  - the set of rational numbers between  $-3$  and  $2$
  
- Write a verbal description of an example of a set for each of the following sets.
  - $\emptyset$
  - $\{\emptyset\}$
  
  
  
  
  
  
  
  
  
  
- Let  $A = \{x : x \text{ is a name for a mammal.}\}$  and  $B = \{2, 5, m, p, \{2\}, \{2, m\}\}$ . Replace each blank with either  $\in$  or  $\notin$ .
  - humpback whale \_\_\_\_\_  $A$
  - great white shark \_\_\_\_\_  $A$
  - $\{5\}$  \_\_\_\_\_  $B$
  - $m$  \_\_\_\_\_  $B$
  
- Use proper set notation to rewrite each set with the list method (roster method).
  - the set of natural number multiples of five between 2 and 38
  - the set of integers which when squared equal 9
  - the set of integers which when squared equal 7
  
- Use proper set-builder notation to rewrite each set.
  - $\{1, 4, 9, 16, 25, 36, 49\}$
  - $\{3, 6, 9, 12, 15, \dots\}$
  - $\{a, e, i, o, u\}$

8. Determine the cardinal number,  $n(A)$ , for each of the following sets.

(a)  $A = \{x : x \text{ is a state in the United States of America.}\}$

(b)  $A = \{x : x \text{ is a letter in the English alphabet.}\}$

(c)  $A = \{x : x \text{ is a letter in the word } \textit{Mississippi}. \}$

9. The following table lists the number of home runs Roger Maris hit while playing for the NY Yankees. Use set-builder notation to give a complete well-defined description of each of the following sets.

Roger Maris	
Year	Home Runs
1960	39
1961	61
1962	33
1963	23
1964	26
1965	8
1966	13

**example:**

$A = \{1960, 1961, 1962, 1963, 1964, 1965, 1966\}$

$A = \{x : x \text{ is a year that Roger Maris played for the NY Yankees.}\}$

(a)  $B = \{39, 61, 33, 23, 26, 8, 13\}$

(b)  $C = \{39, 61\}$

10. Identify which sets are equivalent and which sets are equal.

$A = \{x : x \text{ is a letter in } \textit{terror}\}$ ,  $B = \{x : x \text{ is a letter in } \textit{totter}\}$ ,  $C = \{x : x \text{ is a letter in } \textit{mirror}\}$ ,

$D = \{x : x \text{ is a letter in } \textit{tear}\}$ ,  $E = \{x : x \text{ is a letter in } \textit{tatter}\}$ ,  $F = \{x : x \text{ is a letter in } \textit{treat}\}$ ,

$G = \{x : x \text{ is a letter in } \textit{rate}\}$ ,  $H = \{x : x \text{ is a letter in } \textit{tare}\}$ , and  $I = \{x : x \text{ is a letter in } \textit{rote}\}$

12. For the following questions, consider the set of the students in today's class. *When asked to state a set use either set-builder notation or list/roster form. State the solutions to (a), (b), (g), (h), (i), and (j) in complete sentences.*

(a) What is the cardinality of this set of students?

(b) Justify your answer in part (a).

(c) How many different seating arrangements could be made? (*Assume there are exactly the same number of students and chairs.*) Also, classify the problem type.

(d) If each person helps each other member of today's class on exactly one question, how many times would someone have been helped? Also, classify the problem type.

(e) Write in the simplest possible form  $\{x : x \text{ is a person present in today's class who is either taller than three and one-half meters or shorter than one and one-fourth meters.}\}$