# LING 106: Homework 1

Assigned: 9/10/2007
Due: 9/17/2007

## 1. SPECIFYING SETS

- $A$ = {6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, ...}
  - $A$ = {$x$ | $x$ is a positive integer divisible by 6}
  - $6 \in A$ ; if $x \in A$, then $x + 6 \in A$ ; nothing else is in $A$
- $B$ = {31, 34, 37, 40, 43, 46, 49, 52, 55, 58, 61, 64}
  - $B$ = {$x$ | $x = 3n+1$ for $10 \leq n \leq 21$}
  - $31 \in B$ ; if $x \in B$ and $x+3 \leq 64$, then $x+3 \in B$ ; nothing else is in $B$
- $C$ = {$x$ | $x$ is an integer consisting of a 1 followed by zero or more 0s}
  - $C$ = {1, 10, 100, 1000, 10000, ....}
  - $1 \in C$ ; if $x \in C$, then $10x \in C$ ; nothing else is in $C$
- $D$, such that Maine $\in D$...
  - $D$ = {$x$ | $x$ is one of the 48 US states other than Alaska and Hawai'i}
  - $D$ = {Alabama, Arizona, Arkansas, California, Colorado,
    Connecticut, Delaware, Florida, Georgia, Idaho,
    Illinois, Indiana, Iowa, Kansas, Kentucky,
    Louisiana, Maine, Maryland, Massachusetts, Michigan,
    Minnesota, Mississippi, Missouri, Montana, Nebraska,
    Nevada, New Hampshire, New Jersey, New Mexico, New York,
    North Carolina, North Dakota, Ohio, Oklahoma, Oregon,
    Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee,
    Texas, Utah, Vermont, Virginia, Washington,
    West Virginia, Wisconsin, Wyoming}

    *or*: $D$ = {Alabama, Arizona, Arkansas, ..., Wisconsin, Wyoming}

## 2. SET RELATIONS

$E = \{\mathbf{1}, \{\mathbf{1}\}, \mathbf{2}\}$ $F = \{\mathbf{1}, \mathbf{3}, \mathbf{4}, \{\mathbf{1}, \mathbf{2}\}\}$ $G = \{\mathbf{4}, \mathbf{1}, \{\varnothing\}\}$ $H = \{\mathbf{1}, \varnothing\}$

a. $\mathbf{1} \in E$ **T**
b. $\mathbf{2} \in E$ **T**
c. $\mathbf{2} \subseteq E$ **F**
d. $\{\mathbf{1}\} \in E$ **T**
e. $\{\mathbf{1}\} \subseteq E$ **T**
f. $\{\mathbf{2}\} \in E$ **F**
g. $\{\mathbf{2}\} \subseteq E$ **T**
h. $\{\mathbf{1},\mathbf{2}\} \in F$ **T**
i. $\{\mathbf{1},\mathbf{2}\} \subseteq F$ **F**
j. $\{\mathbf{1},\mathbf{4}\} \subseteq G$ **T**
k. $\{\mathbf{1},\mathbf{4}\} \subseteq H$ **F**
l. $\varnothing \in E$ **F**
m. $\varnothing \subseteq E$ **T**
n. $\varnothing \in G$ **F**
o. $\{\varnothing\} \in G$ **T**
p. $\varnothing \subseteq G$ **T**
q. $\{\varnothing\} \subseteq G$ **F**
r. $\varnothing \in H$ **T**
s. $\{\varnothing\} \in H$ **F**
**t**. $\varnothing \subseteq H$ **T**
u. $\{\varnothing\} \subseteq H$ **T**

## 3. SET OPERATIONS

Using the following sets, and taking the universe to be $I \cup J \cup K \cup L$, specify—in list notation—the sets in (a)-(j).

$I = \{\mathbf{a}, \mathbf{b}, \mathbf{c}, \mathbf{d}\}$ $J = \{\mathbf{a}, \mathbf{b}, \mathbf{c}, \mathbf{d}, \mathbf{e}, \mathbf{f}, \mathbf{g}\}$ $K = \{\mathbf{a}, \{\mathbf{a}, \mathbf{b}\}\}$ $L = \{\mathbf{b}, \{\mathbf{e}\}, \{\mathbf{a}, \mathbf{b}\}\}$

a. $I \cup J$ $\{\mathbf{a}, \mathbf{b}, \mathbf{c}, \mathbf{d}, \mathbf{e}, \mathbf{f}, \mathbf{g}\}$
b. $I \cap J$ $\{\mathbf{a}, \mathbf{b}, \mathbf{c}, \mathbf{d}\}$
c. $I - J$ $\varnothing$
d. $J - I$ $\{\mathbf{e}, \mathbf{f}, \mathbf{g}\}$
e. $J \cap K$ $\{\mathbf{a}\}$
f. $K - J$ $\{\{\mathbf{a}, \mathbf{b}\}\}$
g. $K \cup J'$ $\{\mathbf{a}, \{\mathbf{e}\}, \{\mathbf{a}, \mathbf{b}\}\}$
h. $L \cup J$ $\{\mathbf{a}, \mathbf{b}, \mathbf{c}, \mathbf{d}, \mathbf{e}, \mathbf{f}, \mathbf{g}, \{\mathbf{e}\}, \{\mathbf{a}, \mathbf{b}\}\}$
i. $\wp(K)$ $\big\{\{\}, \{\mathbf{a}\}, \{\{\mathbf{a}, \mathbf{b}\}\}, \{\mathbf{a}, \{\mathbf{a}, \mathbf{b}\}\}\big\}$
j. $L' \cup K'$ $\{\mathbf{a}, \mathbf{b}, \mathbf{c}, \mathbf{d}, \mathbf{e}, \mathbf{f}, \mathbf{g}, \{\mathbf{e}\}\}$
l. U $\{\mathbf{a}, \mathbf{b}, \mathbf{c}, \mathbf{d}, \mathbf{e}, \mathbf{f}, \mathbf{g}, \{\mathbf{e}\}, \{\mathbf{a}, \mathbf{b}\}\}$