CSE 355: Intro to Theoretical Computer Science Recitation #1 (20 pts)

1. [5 pts] Write a short informal English description of the following sets.

Example: $S = \{1, 3, 5, 7, \ldots\}$
Description: Set of all positive odd integers.

a) $A = \{\ldots, -4, -2, 0, 2, 4, \ldots\}$

Set of all even integers

b) $A = \{n \mid n = 2m$ for some m in $N\}$

Set of all positive even natural numbers

c) $A = \{n \mid n = 2m$ for some m in N and $n = 3k$ for some k in $N\}$

Set of all positive natural numbers that can be divided by 2 and 3

d) $A = \{w \mid w$ is a string of 0s and 1s and w equals the reverse of w itself$\}$

Set of all binary numbers who's string is also palindromes

e) $A = \{n \mid n$ is an integer and $n = n + 1\}$

Empty Set

2. [5 pts] Write formal description of the following sets.

Example: The set containing the numbers 1, 10 and 100
Formal description: $S = \{1, 10, 100\}$

a) The set containing all integers that are greater than 5.

$S = \{n \mid n \in \mathbb{Z}, n > 5\}$

b) The set containing all-natural numbers that are less than 5.

$S = \{n \mid n \in \mathbb{Z}, n < 5\}$

c) The set containing the string *aba*

S = {"aba"}

d) The set containing the empty string

S = {""}

e) The set containing nothing at all

S = { }

3. [5 pts] Let A be the set $\{x, y, z\}$ and B be the set $\{x, y\}$, answer the following question: a) Is A a subset of B?

b) What is $A \cup B$?

$A \cup B = \{x, y, z\}$

c) What is A ∩ B?

A ∩ B = {x, y}

d) What is *A X B*?

A x B = {(x, x), (x, y), (y, x), (y, y), (z, x), (z, y)}

e) What is the power set of B?

P(B) = {∅, {x}, {y}, {x, y}}

4. [5 pts] Let *X* be the set {1, 2, 3, 4, 5} and *Y* be the set {6, 7, 8, 9, 10}. The unary function ***f****: X→Y* and the binary function ***g****: X* x *Y→Y* are described below:

n	***f(n)***
1	6
2	7
3	6
4	7
5	6

g	6	7	8	9	10
1	10	10	10	10	10
2	7	8	9	10	6
3	7	7	8	8	9
4	9	8	7	6	10
5	6	6	6	6	6

a) What is the value of *f* (2)?
f(2) = 7

b) What is the range and domain of ***f***?

Domain = {1,2, 3, 4, 5}

Range = {6, 7}

c) What is the value of ***g***(2, 10)?

Val of g(2,10) = 6

d) What are the range and domain of ***g***?

Range = {6, 7, 8, 9, 10}

Domain = {X x Y} = {(1, 6), (1, 7), (1, 8), (1, 9), (1, 10),

(2, 6), (2, 7), (2, 8), (2, 9), (2, 10),

(3, 6), (3, 7), (3, 8), (3, 9), (3, 10),

(4, 6), (4, 7), (4, 8), (4, 9), (4, 10),

(5, 6), (5, 7), (5, 8), (5, 9), (5, 10)}

e) What is the value of $g(4, f(4))$?

Val of $g(4, f(4)) = 8$