CSCE 222 (Carlisle), Discrete Structures for Computing
Spring 2020
Homework 3

Type your name below the pledge to sign
On my honor, as an Aggie, I have neither given nor received unauthorized aid on this academic work.
ARTHUR CHEN

Instructions:

- The exercises are from the textbook. You are encouraged to work extra problems to aid in your learning; remember, the solutions to the odd-numbered problems are in the back of the book.
- Grading will be based on correctness, clarity, and whether your solution is of the appropriate length.
- Always justify your answers.
- Don't forget to acknowledge all sources of assistance in the section below, and write up your solutions on your own.
- *Turn in .pdf file to Gradescope by the start of class on Tuesday, February 4, 2020.* It is simpler to put each problem on its own page using the LaTeX clearpage command.

Help Received:

- List any help received here, or ”NONE”.
  NONE

Exercises for Section 2.1:

24: (2 points). (Prove your answer is correct.)

Yes, according to the definition of equal sign for sets, two sets yield the exact same subsets, thus they are the same.

34(a-d): (2 points)

(a) (a,x,0),(a,x,1),(a,y,0),(a,y,1),(b,x,0),(b,x,1),(b,y,0),(b,y,1),(c,x,0),(c,x,1),(c,y,0),(c,y,1)
(b) (0,x,a),(0,x,b),(0,x,c),(0,y,a),(0,y,b),(0,y,c),(1,x,a),(1,x,b),(1,x,c),(1,y,a),(1,y,b),(1,y,c)
(c) (0,a,x),(0,a,y),(0,b,x),(0,b,y),(0,c,x),(0,c,y),(1,a,x),(1,a,y),(1,b,x),(1,b,y),(1,c,x),(1,c,y)
(d) (x,x,x),(x,x,y),(x,y,x),(x,y,y),(y,x,x),(y,x,y),(y,y,x),(y,y,y),

46(a-d): (2 points)

a. there exists a real number that its cube is negative one. TRUE
b. there exists an integer that is smaller than increment by one of itself. TRUE
c. All the integers is still an integer if decreased by one. TRUE
d. the square of an integer is still integer. TRUE

Exercises for Section 2.2:

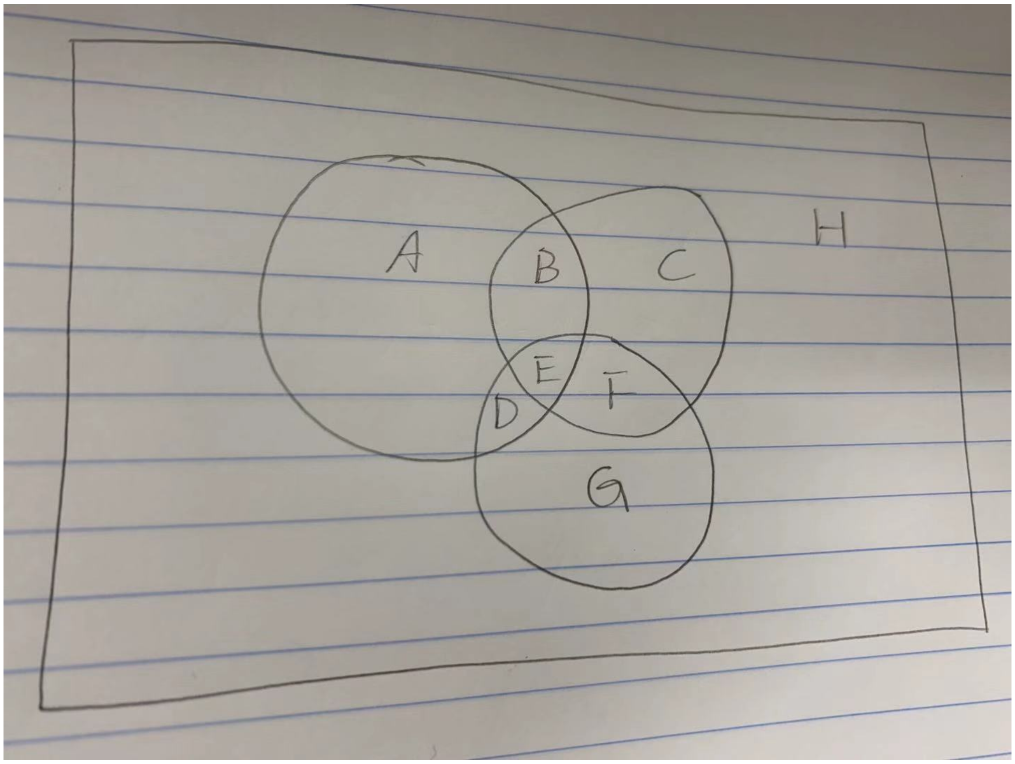
14: (1 points)

The elements in A are either in B or not in B
The elements in B are either in A or not in A
So, based on given, we have:
$A = (A \cap B) \cup (A - B) = 1, 3, 5, 6, 7, 8, 9$
$B = (A \cap B) \cup (B - A) = 2, 3, 6, 9, 10$

20d: (1 points)

1. set $x \in A \cap b \cap c$
2. $x \in A \land x \in B \land x \in C$
3. $x \in A \land x \in B$
4. $x \in A \land B$
5. proven

28(a-c): (2 points)



a. BED
b. H
c. ABCD
50: (1 point)
since A and B are finite sets, set that A has n elements and B has m elements.
therefore, at most, $A \cup B$ will have no more than n + m elements (some might overlap), which means it is a finite set as well

Exercises for Section 2.3:

8 (a,c,e,g): (2 points)
a. 1
c. -1
e. 3
g. 1

20(a-d): (2 points)
a. assume f(n) = 3n.
since f(n) = f(m) makes 3n = 3m, it is one to one
but there is no number will make f(n) = 5 so it is not onto

b. make f(n) = 3n if n is positive
= -3n if n is negative
= 0 if n is 0
With all possible n,three results will be covered and overlapping

c. f(n) = n-1 if n is odd
= n+1 if n is even

d. f(n) = -n if n is positive
= n if n is negative
= 1 if n is 0
not one to one: f(0) = f(-1)
not onto: f(n) can not be 0

34(a): (2 points)
since $(f \circ g)(a) = f(g(a))$, and $f(g(a))$ is also considered as one of the function f, $(f \circ g)(a)$ is considered as one of the function f as well.
Since $(f \circ g)(a)$ is onto, function f is onto, too.

38: (2 points)
$(f \circ g)(x) = x^2 + 4x + 5$
$(g \circ f)(x) = x^2 + 3$

58: (1 points)
1. a $\leq n \leq b$
2.$\lceil a \rceil \leq n \leq \lfloor b \rfloor$
3.$since \lceil a \rceil$ and $\lfloor b \rfloor$ are integers, we can calculate that the number between them is $\lfloor b \rfloor - \lceil a \rceil) + 1$