CS 225 Assignment 3 - Part 1
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Homework Sets: 6.1 { 3, 7, 13, 18, 33, 34}

3a) No. There are elements that in R that are not in T. 2 is in R but not in T, and 2 is not divisible by 6.

3b) Yes. Every number divisible by 6 is divisible by 2.

n = 6m … 6m = 2(3m). 3m is an integer so 2 * (some integer) proves that n is divisible by 2.

3c) Yes. Every number divisible by 6 is divisible by 3.

n = 6m … 3(2m). 2m is an integer so 3 * (some integer) proves that n is divisible by 3.

(A) x = 6a + 4 for some integer a

(B) y = 18b - 2 for some integer b

(C) z = 18c + 16

7a) A is not a subset of B

6a + 4 = 18b - 3 (solve for b)

6a + 7 = 18b … = (6a + 7) / 18 = b

b = (6a + 7) / 18 (not an integer)

7b) B is a subset of A
18b - 2 = 6a + 4 (solving for a)

18b - 6 = 6a

a = 3b - 1

b = (a + 1) / 3

18(a+1)/3 - 2 = (18a + 18) / 3 - 2 = 6a + 6 - 2 = 6a + 4

7c) Finding B subset C and C subset B will determine the proof of the statement.The statement is proven below:

Solve for C
18b - 2 = 18c + 16
18b - 18 = 18c
c = b - 1

Substitute in b-1 for c
18(b-1) + 16 = 18b - 18 + 16 = 18b - 2

Now solve for B
18b - 2 = 18c + 16
18b = 18c + 18
b = c + 1

Is B = C?

18(c+1) - 2 = 18(b - 1) + 16
18c + 18 - 2 = 18b - 18 + 16
18c + 16 = 18b - 2

18c + 16 is in C therefore it is an element of B. B and C are subsets of eachother, we know that B = C.

13a) True. Positive integers are real numbers.
13b) False. -sqrt(2) is a real number but not rational.
13c) False. 2/3 is not a real number.
13d) False. 0 is only an element in Z, not Z- or Z+.
13e) True. It would just be an empty set because Z- only contains negative integers and Z+ only contains positive integers.
13f) True. Q is a subset of R.
13g) True. Q is a subset of R, and R is a subset of Q. Therefore the Q and R is true.
13h) True. Z+ is a subset of R (and vice versa). Therefore Z+ and R is true.
13i) False. 2/3 might be in the set on the right, but not on the set in the left.

18a) No. 0 would be in a set of all real numbers {0, 1, 2, 3…n}. An empty set has no elements.

18b) No. { } = {{ }}. An empty set equal to a set which contains one element (which is an empty set).

18c) Yes. The empty set is a member of the set that contains one element.

18d) No. An empty set is not an element of an empty set.

33a) = { Ø }. Partition of an empty set.

33b) = P({Ø}) = { Ø, { Ø } }

33c) = P{ Ø, { Ø } } = { Ø , {{ Ø }}, { Ø, { Ø } } }

A1 = { 1, 2, 3 }

A2 = { u, v }

A3 = { m, n }

34a)
= { (1, (u, m)), (1, (u, n)), (1, (v, m)), (1, (v, n)),
(2, (u, m)), (2, (u, n)), (2, (v, m)), (2, (v, n)),
(3, (u, m)), (3, (u, n)), (3, (v, m)), (3, (v, n)) }

34b)

= { ((1, u), m), ((1, u), n), ((1, v), m), ((1, v), n),
((2, u), m), ((2, u), n), ((2, v), m), ((2, v), n),
((3, u), m), ((3, u), n), ((3, v), m), ((3, v), n) }

34c)

= { (1, u, m), (1, u, n), (1, v, m), (1, v, n),
(2, u, m), (2, u, n), (2, v, m), (2, v, n),
(3, u, m), (3, u, n), (3, v, m), (3, v, n) }