CS2200 F-24 Homework

Homework Policy

Always explain your answers. This is an important part of every HW assignment. Late homework has a 20%

penalty and homework turned later than 11:59 pm the day it is due will have a late penalty. A turn in later than one day

will receive a grade of zero. HW solutions obtained from other students or online is considered a violation of academic

integrity. Ask the Instructor if you have academic integrity concerns about the solutions you are turning in.

CS 2200

HW 05

Fall 2024

Points:

Reference:

10 points

Epp5 Chapter.Sections: 3.1, 3.2, 6.1

Textbook Problems:

Notation: Chapter.Section.Problem# / Page#

1. Epp5 problem 3.1.6 b, c / p119.
2. Epp5 problem 3.1.23 b / p120.
3. Epp5 problem 3.2.15 b, d, e / p130.
4. Epp5 problem 3.2.46 / p131.
5. Epp5 problem 6.1.4 / p388.
6. Epp5 problem 6.1.15 b, c / p389.
7. Epp5 problem 6.1.16 b, c / p389.

7 Epps problem 3.1.6 bc/p119

b. $Z^+$

$Z^+ = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$

© The set of all even integer.

Ans

$= \{-8, -6, -4, -2, 0, 2, 4, 6, 8\}$

Epps problem 3.4.23 b / p 120

(b) Every computer science student needs to take data structure.

$\forall x$ :- (If-then form)

If a student is a computer science student, then that student needs to take data structures.

$\forall x$ :- (without if-then):

Computer science students need to take data structures

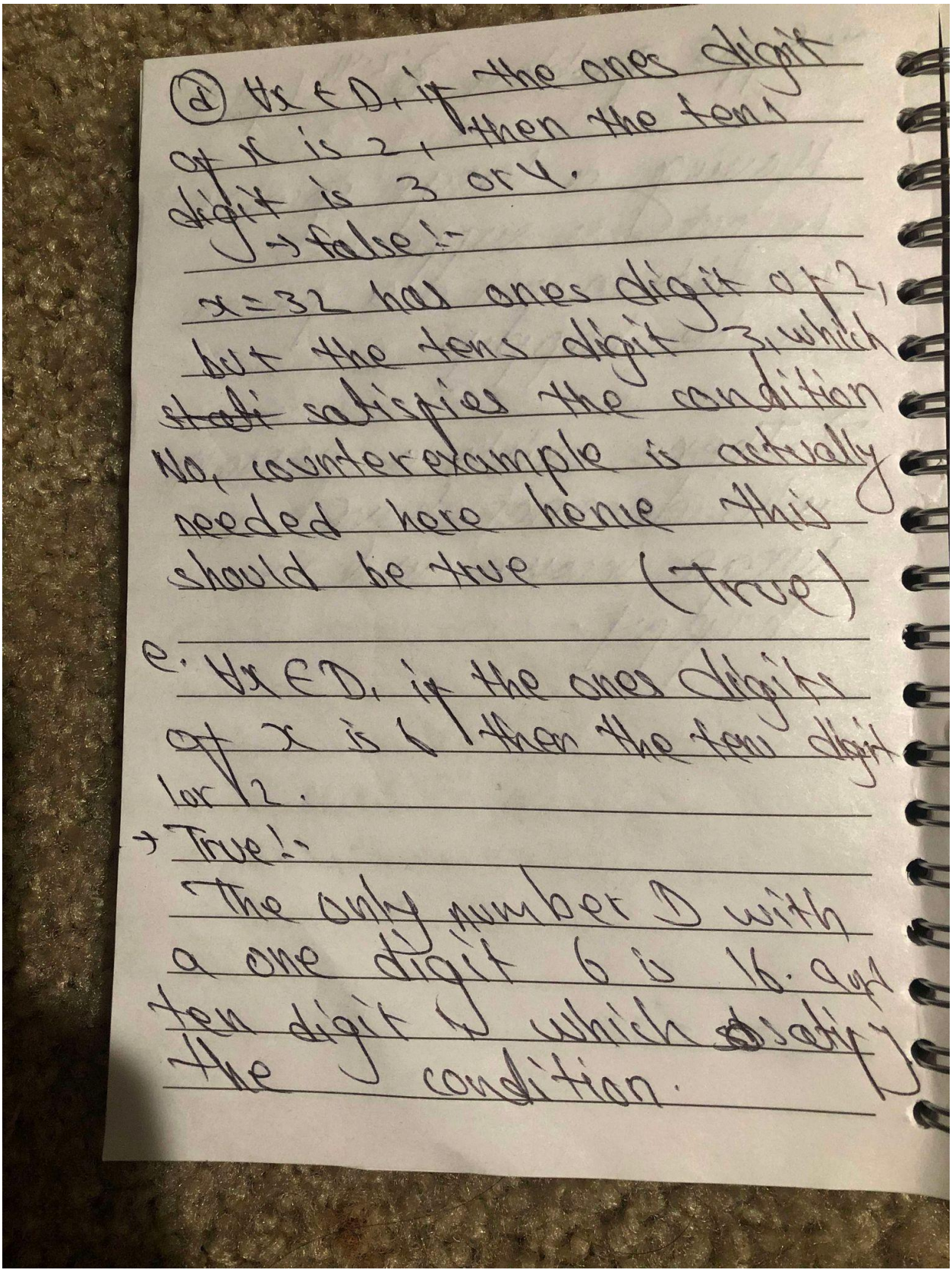
3. Epps problem 3.2.15 b d e / p 130

(b) $\forall x \in D$, if $x$ is less than 0 then $x$ is even.

→ False!-

$x = -14$ is less than 0 and even, but $x = -8$ is also even. However $x = -3$ is odd (but not in D) But since all negative here are ~~given~~ even, this statement is actually true.

(True)



(d) $\forall x \in D$, if the ones digit of $x$ is 2, then the tens digit is 3 or 4.

→ false!:

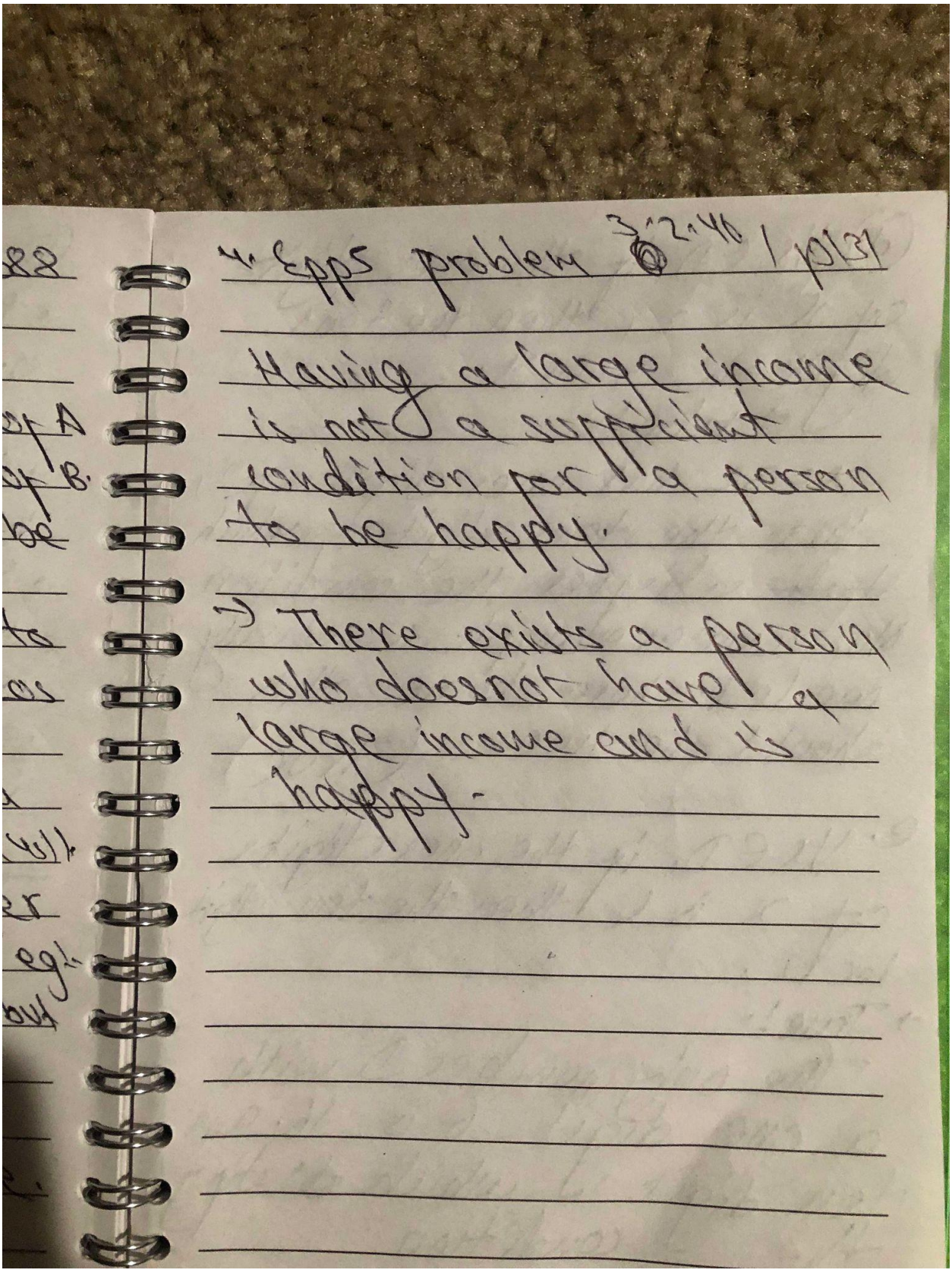
$x = 32$ has ones digit of 2, but the tens digit 3, which satisfies the condition

No, counterexample is actually needed here hence this should be true (True)

e. $\forall x \in D$, if the ones digit of $x$ is 1, then the tens digit is 1 or 2.

→ True!:

The only number D with a one digit 6 is 16. and ten digit D which satisfy the condition.



4. Epps problem 3.2.46 / p131

Having a large income is not a sufficient condition for a person to be happy.

∃ There exists a person who doesnot have a large income and is happy.

Q8. Epp5 problem 6.1.4 / p388

(a) $A \subseteq B$

- for $A \subseteq B$, every element of A must also be an element of B.
- An element $n \in A$ can be written as $n = 5r$.
- For n to also belong to B, $5r$ must equal $2s$ for some integer s.
- This means r must be a multiple of 4 (since $2s = 5(4)$).
- However, not every integer r is a multiple of 4. For eg:- if $r = 1$, then $n = 5$ is in A but not in B.

Thus,

$A \subseteq B$ is not true.

⑥ $B \subseteq A$

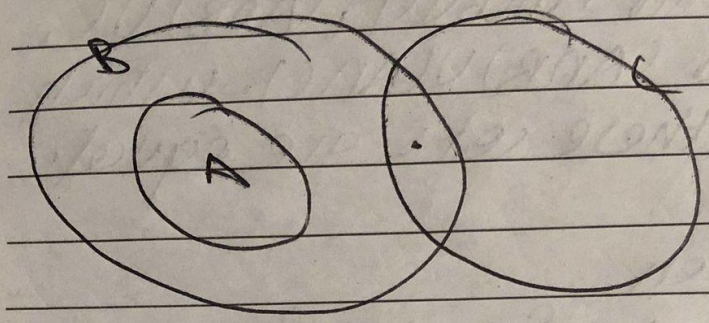
- For $B \subseteq A$, every element of B must also be an element of A.
- An element $m \in B$ can be written as $m = 20s$.
- Since $20s = 5(4s)$, every m in B can be expressed as a multiple of 5.
- Therefore, every element in B is also in A.

Thus,

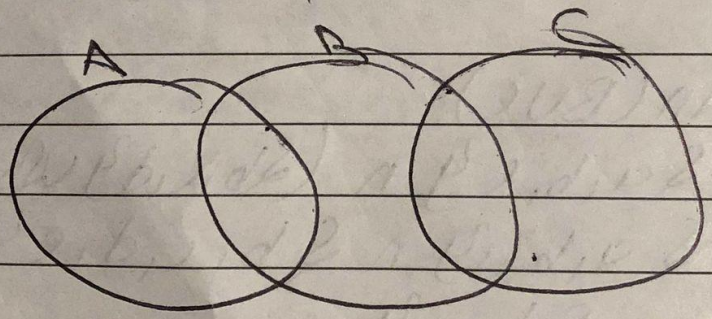
$B \subseteq A$ is true.

6. Epps problem 6.1.15 b, c / p389

(b) $A \subseteq B$, $C \subseteq B$, $A \cap C \neq \emptyset$




(c) $A \cap B \neq \emptyset$, $B \cap C \neq \emptyset$, $A \cap C = \emptyset$
$A \not\subseteq B$, $C \not\subseteq B$



7. Epps problem 6.6.16 b.)
(p389

a. Find $A \cap (B \cup C)$, $(A \cap B) \cup C$, and $(A \cap B) \cup (A \cap C)$. Which of these sets are equal.

Given

$A = \{a, b, c\}$

$B = \{b, c, d\}$

$C = \{b, c, e\}$

$A \cap (B \cup C)$

$= \{a, b, c\} \cap (\{b, c, d\} \cup \{b, c, e\})$

$= \{a, b, c\} \cap \{b, c, d, e\}$

$= \{b, c\}$

$(A \cap B) \cup C$

$= \{a, b, c\} \cap \{b, c, d\}) \cup C$

$= \{b, c\} \cup \{b, c, e\}$

$= \{b, c, e\}$

$(A \cup B) \cap (A \cup C)$

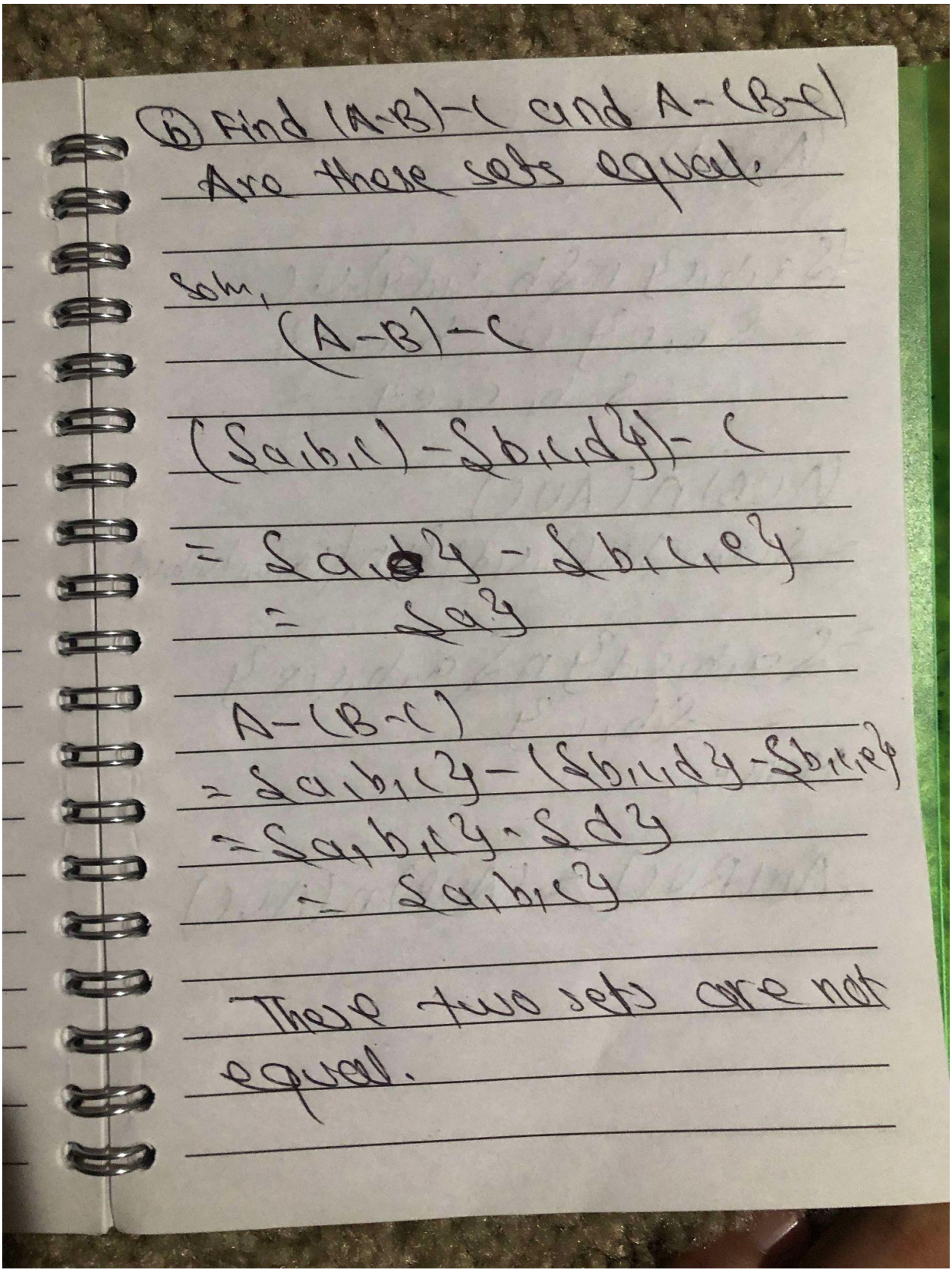
$= \{(a, b, c) \cup (b, c, d)\} \cap \{(a, b, c) \cup (b, c, e)\}$

$= \{a, b, c, d\} \cap \{a, b, c, e\}$

$= \{b, c\}$

Hence,

$A \cap (B \cup C) = (A \cup B) \cap (A \cup C)$



⑥ Find (A-B)-C and A-(B-C) Are these sets equal.

Soln,

(A-B)-C

({a,b,c}-{b,c,d})-C

= {a,d}-{b,c,e}

= {a}

A-(B-C)

= {a,b,c}-({b,c,d}-{b,c,e})

= {a,b,c}-{d}

= {a,b,c}

These two sets are not equal.