Exercise 2.2 (Solutions) Page 40

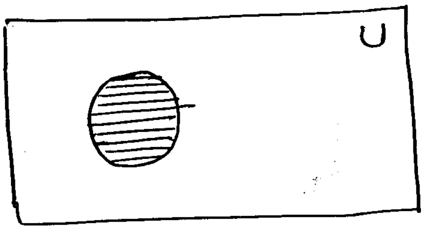
Textbook of Algebra and Trigonometry for Class XI

Available online at http://www.megalecture.com , Version: 1.0

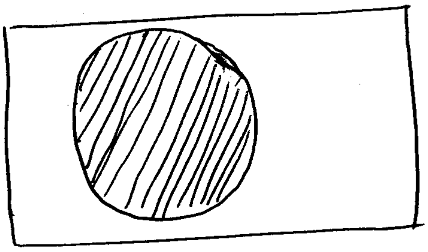
Q # 1:

i) $A \subseteq B$

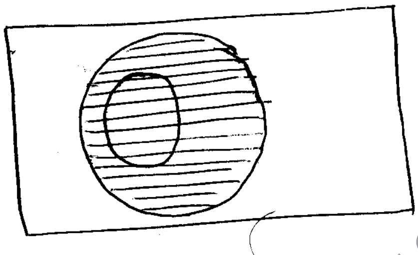
A:



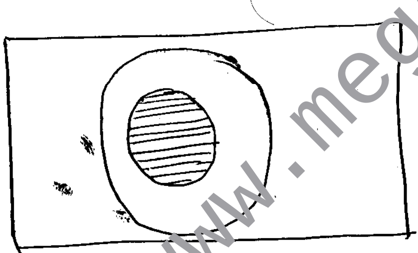
B:



$A \cup B$:



$A \cap B$:



ii) $B \subseteq A$

Just interchange A and B in above case.

iii) $A \cup A'$

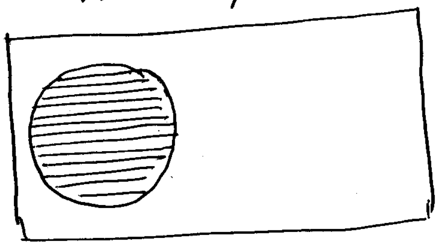
Unable to understand, what is this ? FALSE

see relationship between A & B at page 39 (of book)

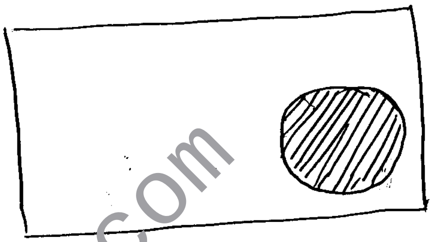
iv) A and B are disjoint

i.e $A \cap B = \phi$

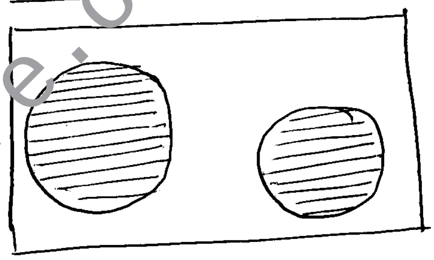
A:



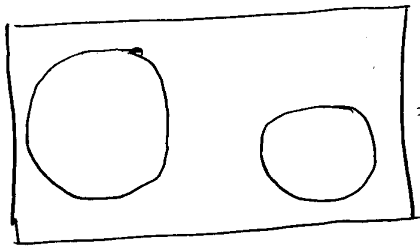
B:



$A \cup B$:



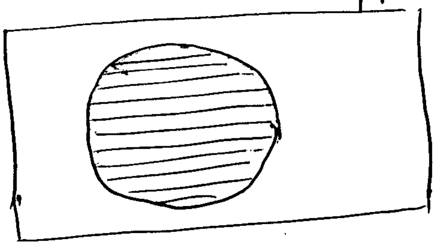
$A \cap B$:



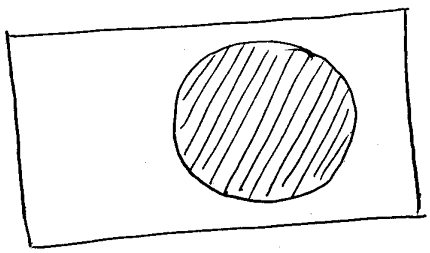
$= \phi$

v) A and B are overlapping sets

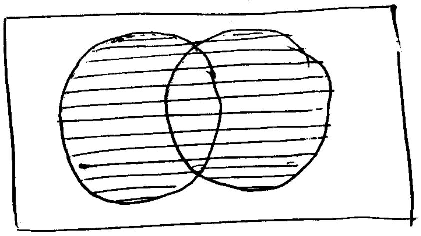
A:



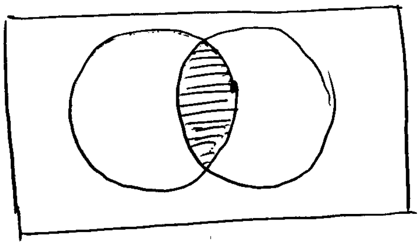
B:



$A \cup B$:



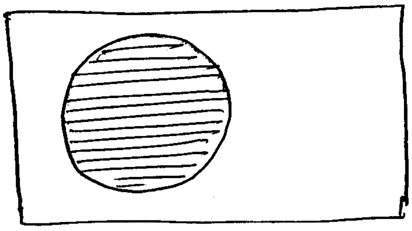
$A \cap B$:



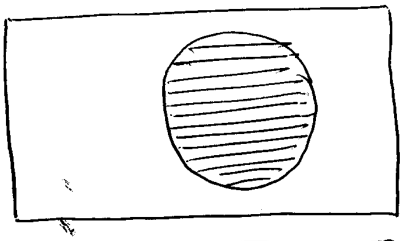
Q#2:

i) A and B are overlapping set

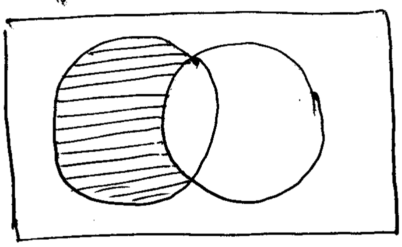
A:



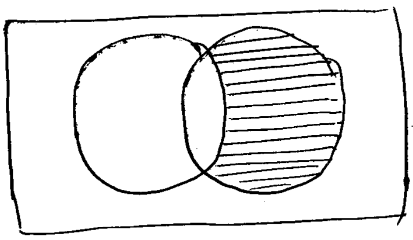
B:



$A - B$:

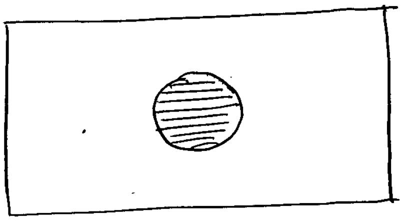


$B - A$:

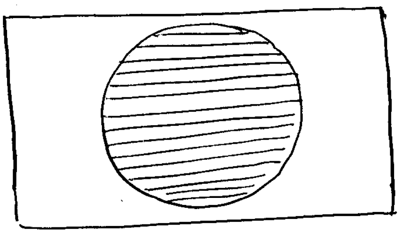


ii) $A \subseteq B$

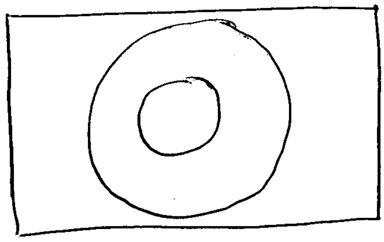
A:



B:

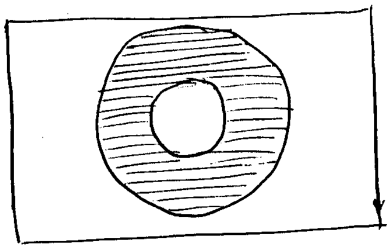


$A - B$:



$= \phi$

$B - A$:



ii) $B \subseteq A$

Do yourself, just ~~replace~~ interchange A and B in above question.

Q#3:

i) $A \cup B = A$
if $B \subseteq A$ or $(B = \phi)$

ii) $A \cup B = B$ if $A \subseteq B$

iii) $A - \phi = \phi$ (if $A = \phi$)

* Correction
$A - B = \phi$ if $A \cap B = \phi$

iv) $A \cap B = B$ if $B \subseteq A$

v) $n(A \cup B) = n(A) + n(B)$
if $A \cap B = \phi$

vi) $n(A \cap B) = n(A)$ if $A \subseteq B$.

vii) $A - B = A$ if $A \cap B = \phi$

viii) $n(A \cap B) = 0$ if $A \cap B = \phi$

ix) $A \cup B = U$
if $B = A'$ or $A = B'$

x) $A \cup B = B \cup A$
it is always true.

xi) $n(A \cap B) = n(B)$ if $B \subseteq A$.

xii) $U - A = \phi$ if $U = A$.

Q # 4:

$U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

$A = \{2, 4, 6, 8, 10\}$

$B = \{1, 2, 3, 4, 5\}$

$C = \{1, 3, 5, 7, 9\}$

i) $A^c = U - A$
$= \{1, 3, 5, 7, 9\}$

ii) $B^c = U - B$
$= \{6, 7, 8, 9, 10\}$

iii) $A \cup B = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

iv) $A - B = \{6, 8, 10\}$

v) $A \cap C = \{\ \}$ i.e ϕ

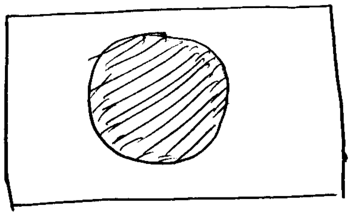
vi) $A^c \cup C^c = (U - A) \cup (U - C)$
$= \{1, 3, 5, 7, 9\} \cup \{2, 4, 6, 8, 10\}$
$= \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

vii) $A^c \cup C = \{1, 3, 5, 7, 9\} \cup \{1, 3, 5, 7, 9\}$
$= \{1, 3, 5, 7, 9\}$

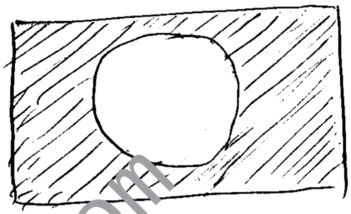
viii) $U^c = U - U$
$= \phi$

Q # 5:

i) A :

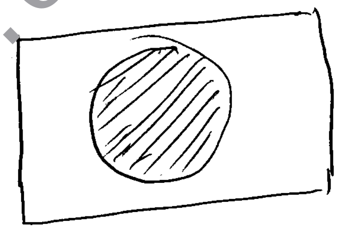


i) A^c :



$= U - A$

ii) $A \cap U$:



$= A$

iii) $A \cup U = U$

iv) $A \cup \phi = A$ v) $\phi \cap \phi = \phi$

Q # 6:

This is a very good question but there is no condition on A and B like in Q # 1 and 2.

The condition are the following

i) $A \subseteq B$ ii) $B \subseteq A$

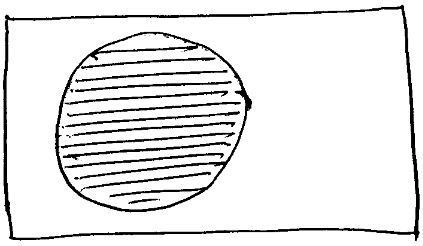
iii) A and B are disjoind
i.e $A \cap B = \phi$

iv) A and B are overlapping.

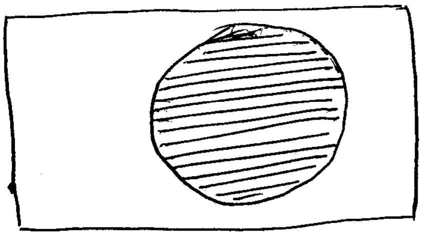
We only discuss last condition
You may solve others yourself.

i) $A - B = A \cap B^c$ *Correction

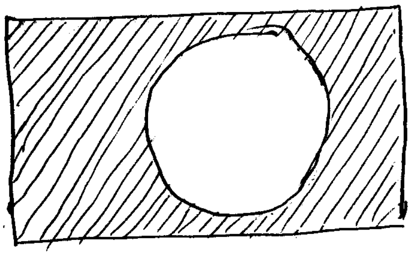
A :



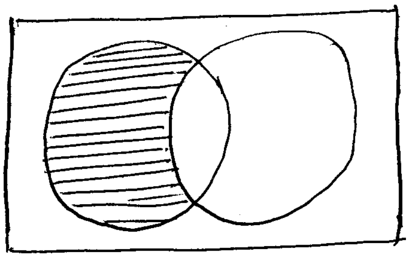
B :



B^c :

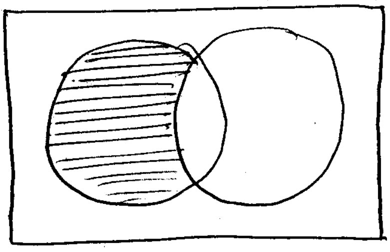


A−B :



—(i)

$A \cap B^c$:



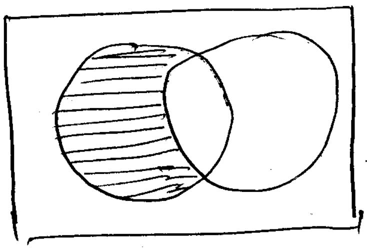
—(ii)

From (i) & (ii) $A - B = A \cap B^c$

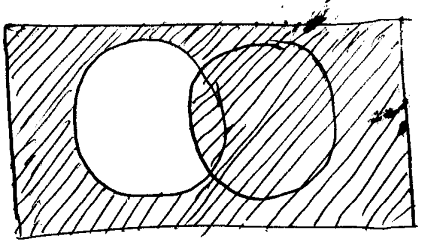
---

ii) $(A-B)^c \cap B = B$

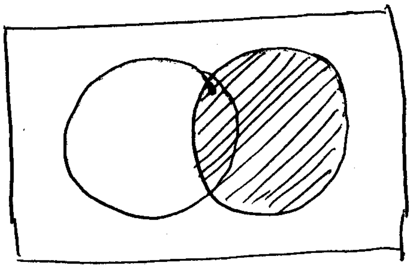
A−B :



$(A-B)^c$:



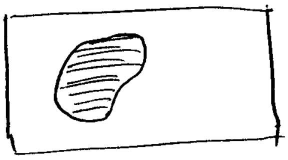
$(A-B)^c \cap B$:



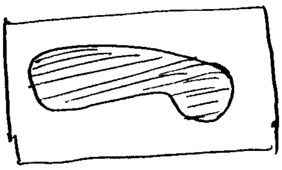
$= B$ proved

Note: For the sake of beauty, we draw sets as circular region, otherwise we can draw any close region to show set, e.g.

A :



B :



—: END :—

To download notes of other exercises visit:
http://www.megalecture.com