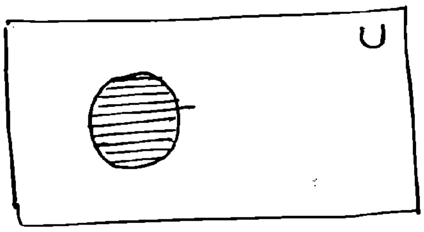
Exercise 2.2

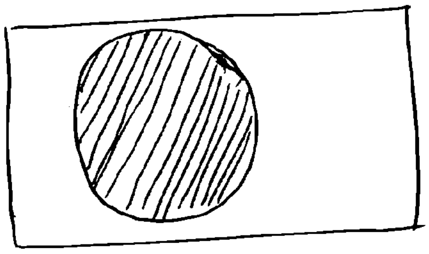
Q # 1:

i) $A \subseteq B$

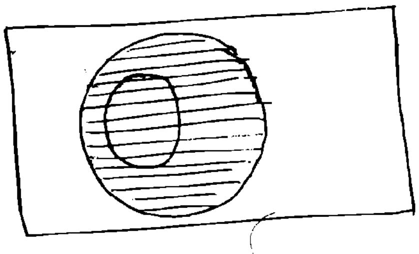
A :



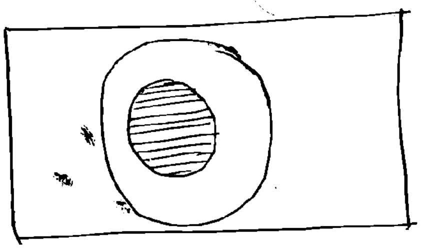
B :



$A \cup B$:



$A \cap B$:



ii) $B \subseteq A$

Just interchange A and B in above case.

iii) $A \cup A'$

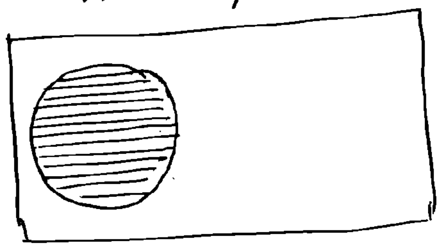
Unable to understand, what is this ? FALSE

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

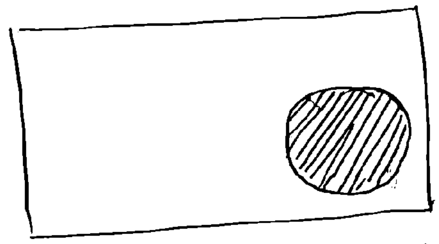
iv) A and B are disjoint

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

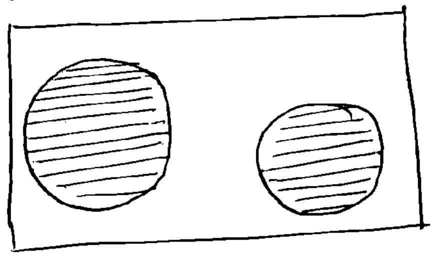
A :



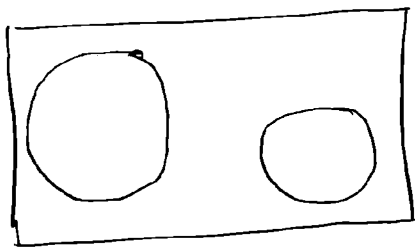
B :



$A \cup B$:



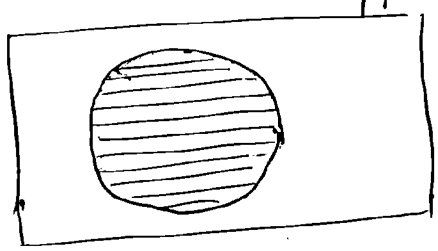
$A \cap B$:



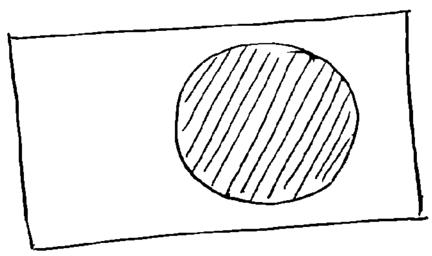
$= \phi$

v) A and B are overlapping sets

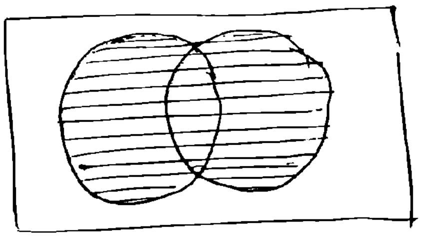
A :



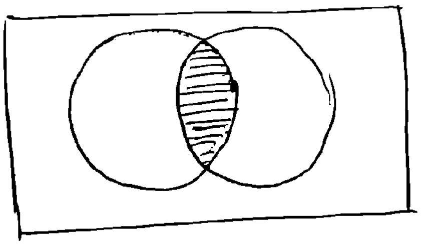
B :



$A \cup B$:



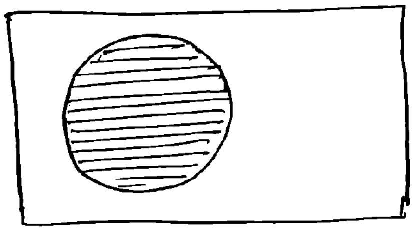
$A \cap B$:



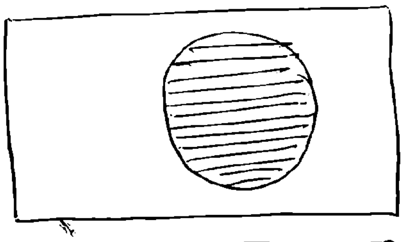
Q#2:

i) A and B are overlapping set

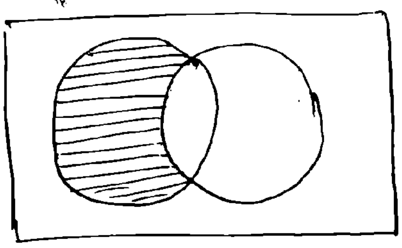
A:



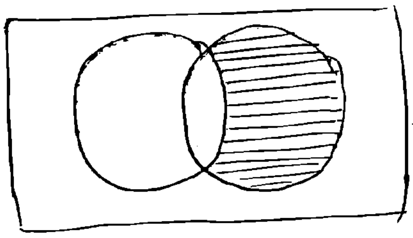
B:



$A-B$:

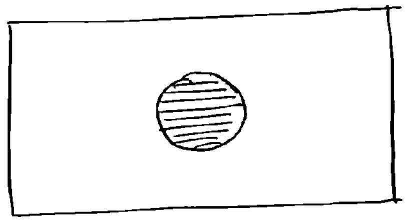


$B-A$:

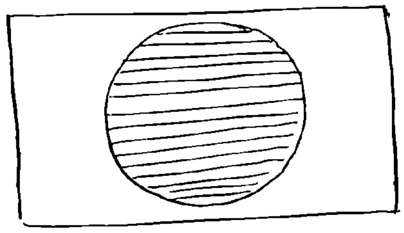


ii) $A \subseteq B$

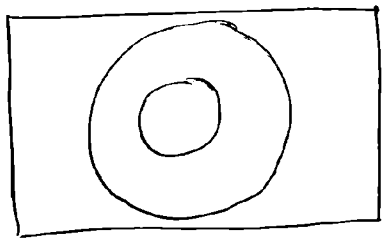
A:



B

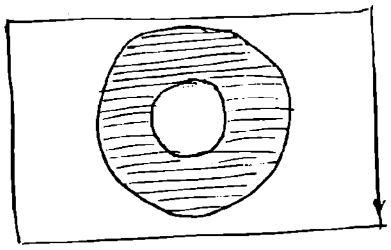


$A-B$:



$= \phi$

$B-A$:



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

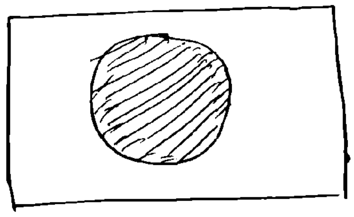
$= \{1,3,5,7,9\}$

viii) $U^c = U - U$

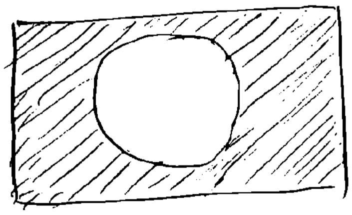
$= \phi$

Q # 5:

A :

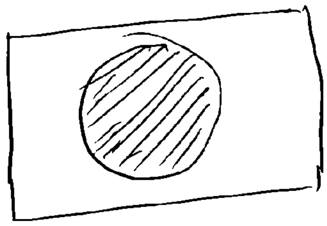


i) A^c :



$= U - A$

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

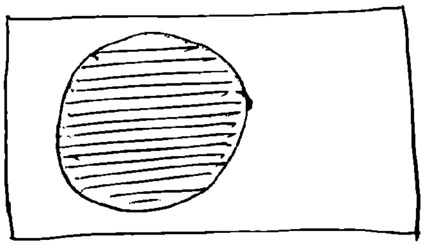
i.e $A \cap B = \phi$

iv) A and B are overlapping.

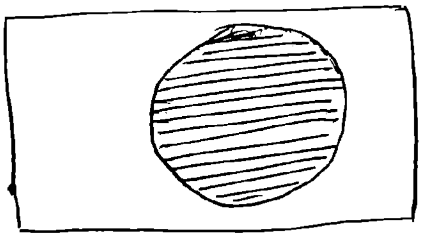
We only discuss last condition You may solve others yourself.

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

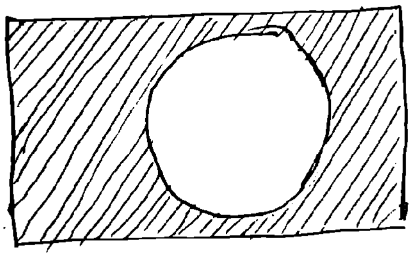
A :



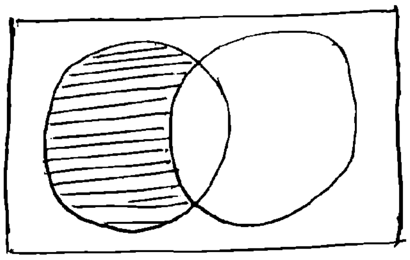
B :



B^c :

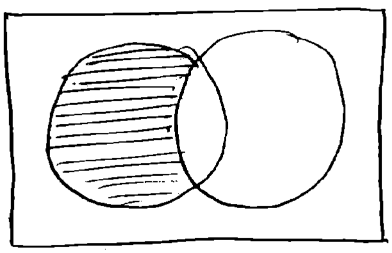


$A - B$:



— (i)

$A \cap B^c$:



— (ii)

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

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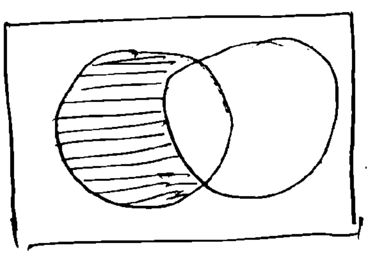
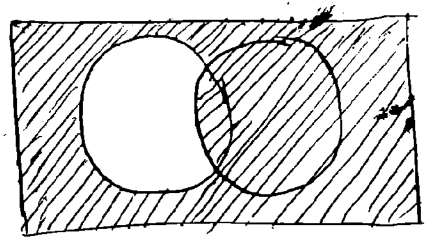
ii) $(A-B)^c \cap B = B$

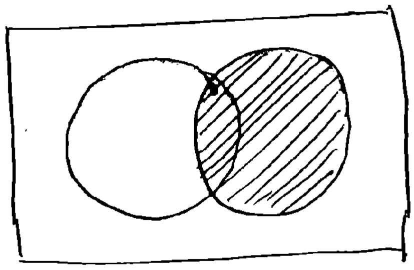
$A - B$:



$(A-B)^c$:



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

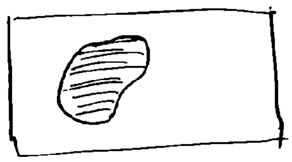


$= B$

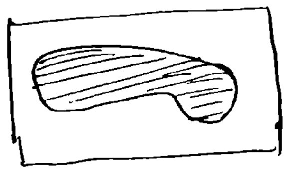
proved

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 :—