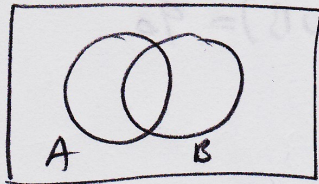


### 3.3 Venn Diagrams and Counting

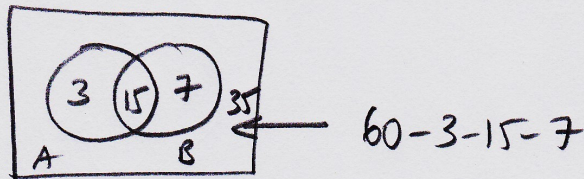
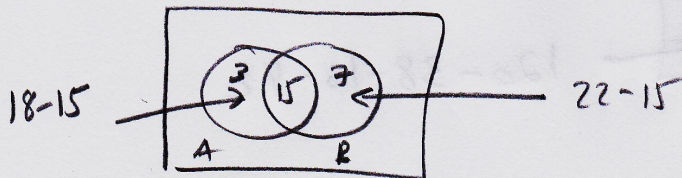
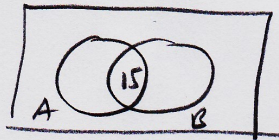


4 basic regions

Ex:  $n(U) = 60$

$n(A) = 18$   $n(B) = 22$   $n(A \cap B) = 15$

- a) Draw a Venn diagram  
start with a basic region



- b) How many elements are in  
A but not B?

$n(A \setminus B) = 3$

Ex:  $n(U) = 120$

$n(A) = 48$   $n(B) = 52$   $n(A \cup B) = 90$

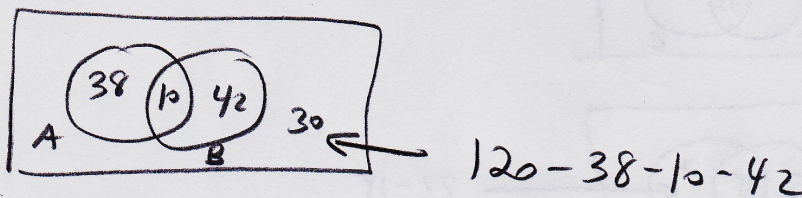
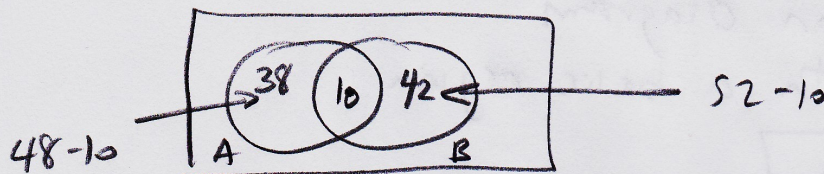
Draw a Venn diagram

i)  $n(A \cap B) = ?$

$n(A \cup B) = n(A) + n(B) - n(A \cap B)$

$90 = 48 + 52 - n(A \cap B)$

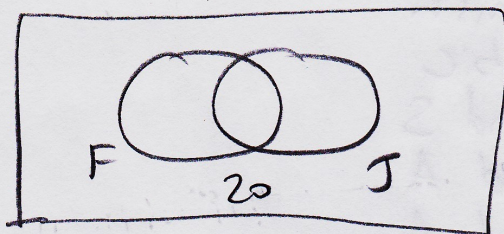
$n(A \cap B) = 10$



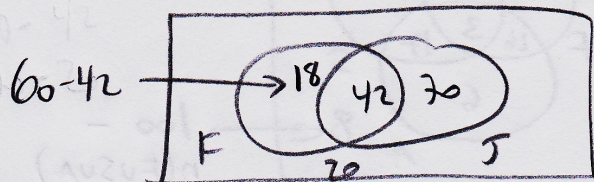
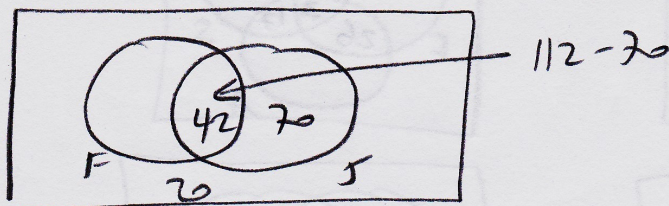
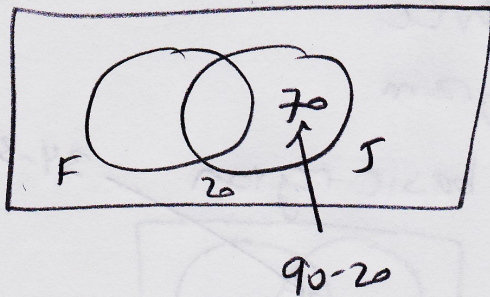
Ex: Out of 150 students, 60 are first-year, 112 have a job and 20 are non-first-year with no job.

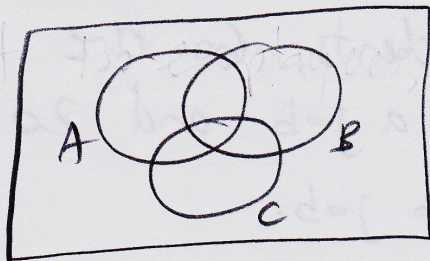
Draw a Venn diagram.

F: first-year  
J: has a job



60 first-year  
 $150 - 60 = 90$  non-first-year



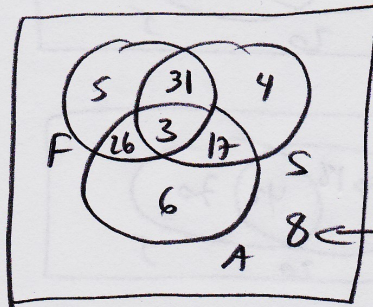
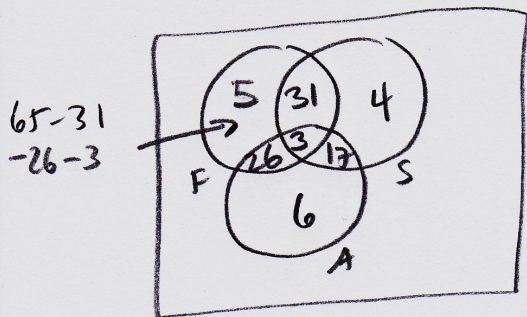
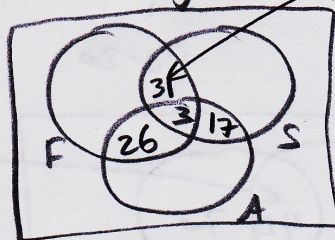
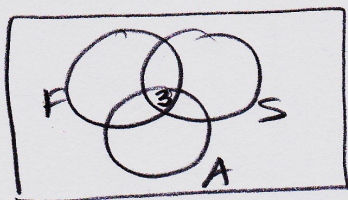


8 basic regions

Ex: of 100 employees,  
 65 speak French  
 55 Spanish  
 52 Arabic  
 34 F and S  
 29 F and A  
 26 S and A  
 3 all three

Draw a Venn diagram

→ Start with a basic region  $34-3$



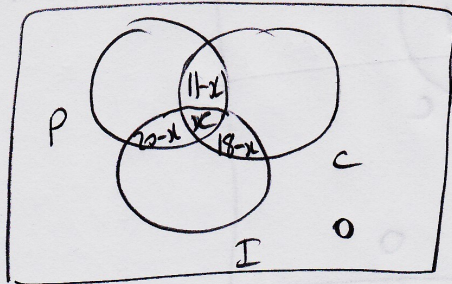
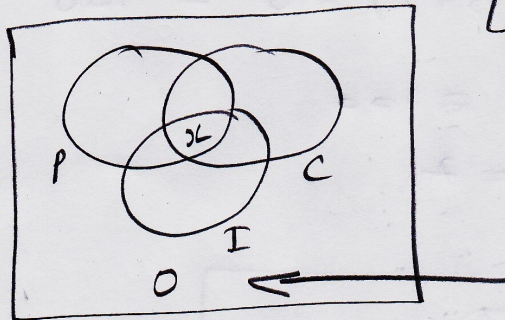
$100 - n(FUSUA)$

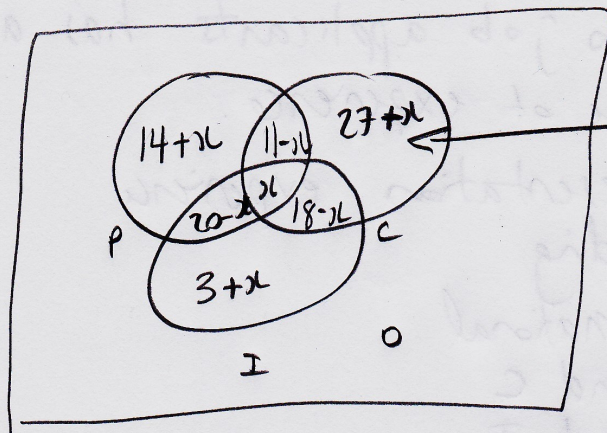
Ex: Each of 100 job applicants has at least one type of experience.

- 45 have presentation experience
- 56 Coding
- 41 international
- 11 P and C
- 20 P and I
- 18 C and I

Draw a Venn diagram

Let  $n(P \cap C \cap I) = x$





$$\begin{aligned}
 & 56 - (11-x) - x \\
 & \quad - (18-x) \\
 & = 56 - 11 + x - x \\
 & \quad - 18 + x \\
 & = 27 + x
 \end{aligned}$$

$$n(u) = 100$$

$$\begin{aligned}
 & (14+x) + (11-x) + (20-x) + x + (27+x) \\
 & + (18-x) + (3+x) + 0 = 100
 \end{aligned}$$

$$93 + x = 100$$

$$x = 7$$

