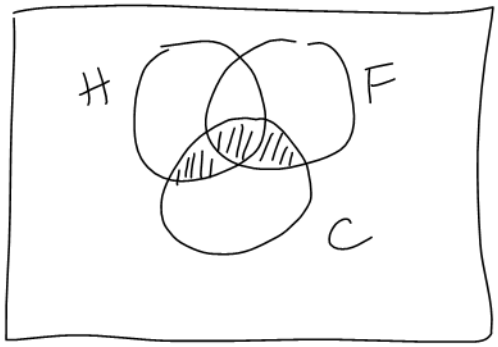
(1) $n(H \cap F) = 6 + 5$
$= 11$

(3) $n(F) = 6 + 5 + 15 + 20$
$= 46$

(5) $n(H' \cap F' \cap C) = 11$

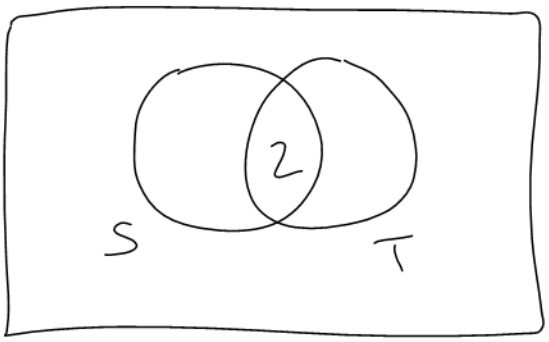
(7) $n(H \cup F) = 19 + 10 + 6 + 5 + 15 + 20$
$= 75$

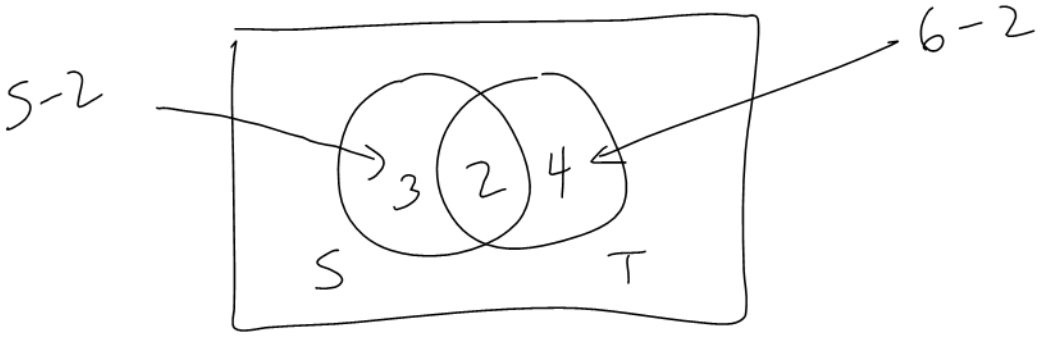
(9) $n((H \cup F) \cap C) = 10 + 5 + 15$
$= 30$

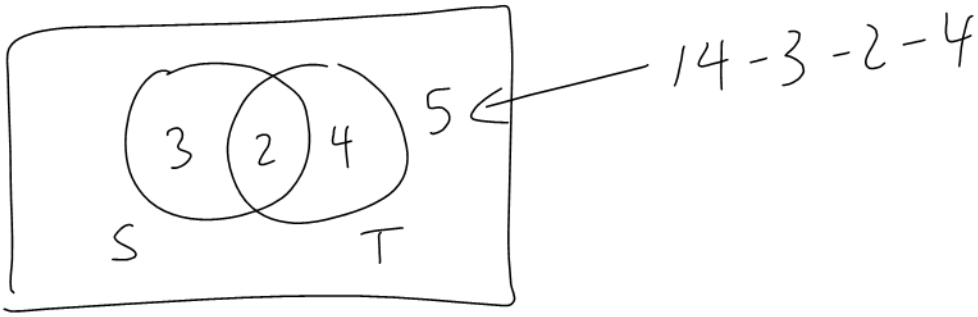


$(H \cup F) \cap C$

11







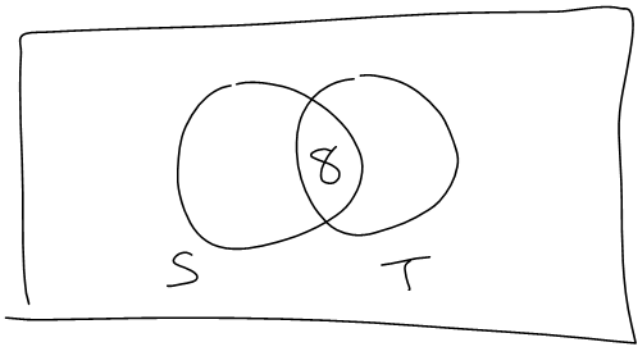
(13) Inclusion-Exclusion Principle

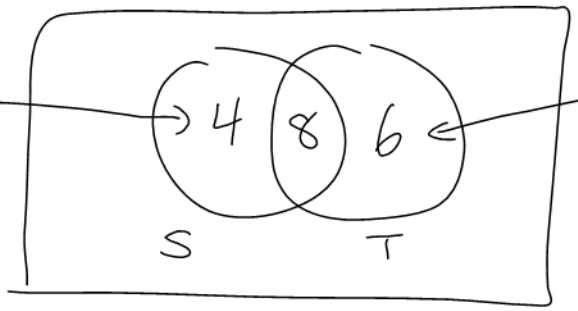
$$n(S \cup T) = n(S) + n(T) - n(S \cap T)$$

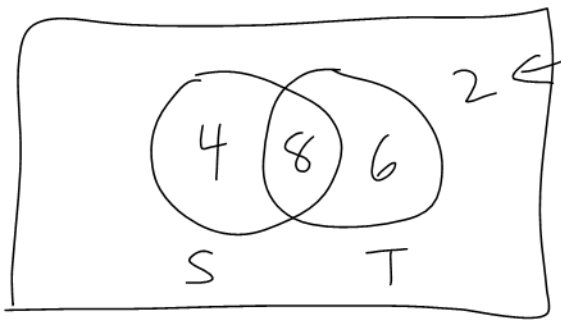
$$18 = 12 + 14 - n(S \cap T)$$

$$n(S \cap T) + 18 = 26$$

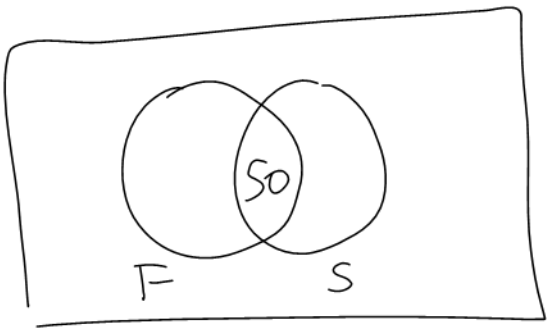
$$n(S \cap T) = 8$$

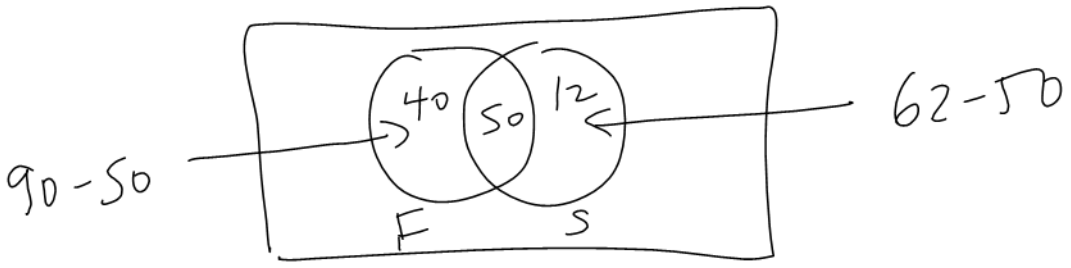


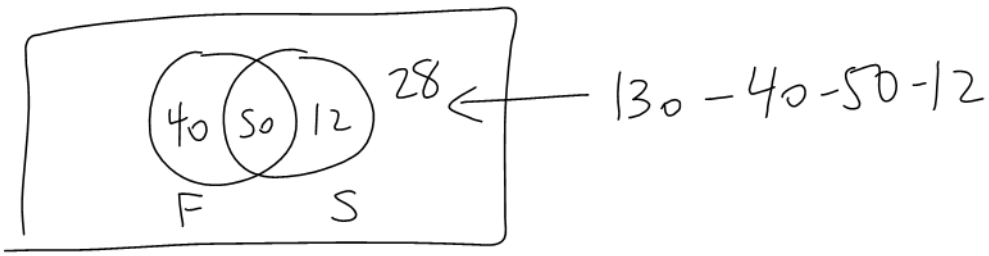




(27) F : Correctly answered first question
S : " second "





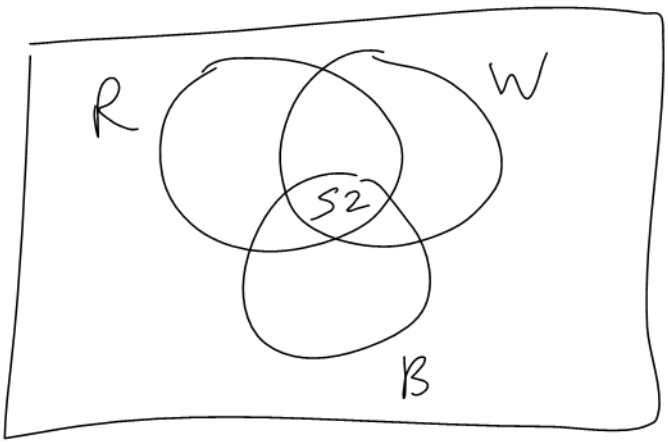


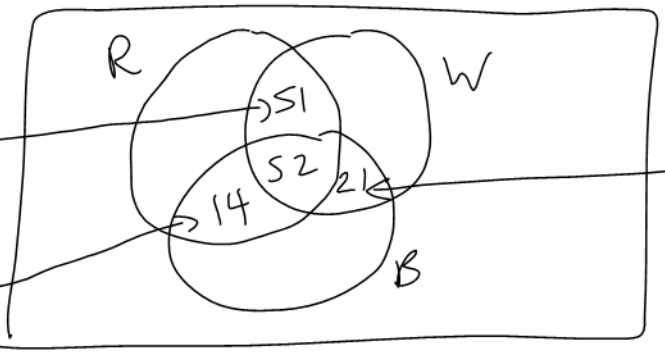
$n(F' \cap S') = 28$

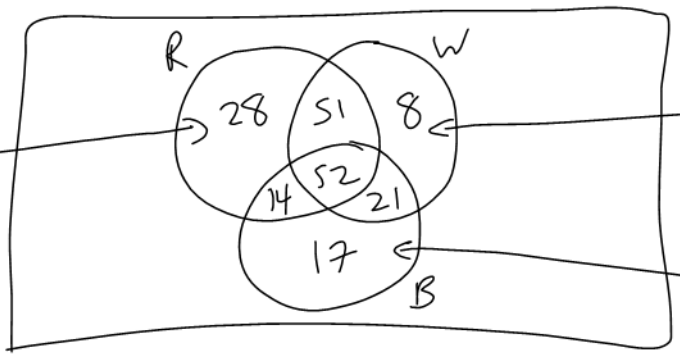
(29) $n(S \cap F') = 12$

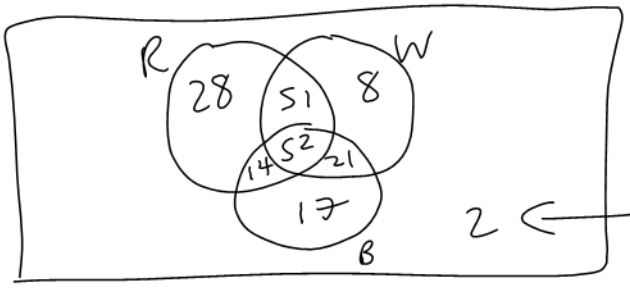
(33)

R : flag contains red
W : " white
B : " blue









→

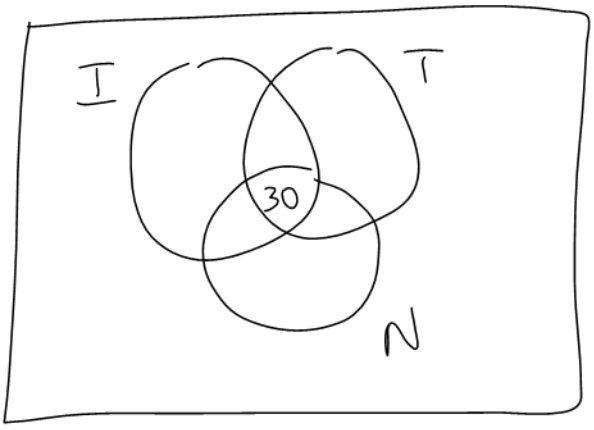
(33) Cont'd $n(R \cap W' \cap B') = 28$

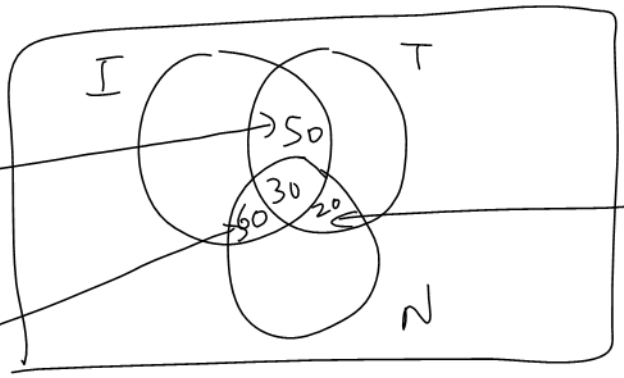
(35) $n(R' \cap W' \cap B') = 2$

(37) $n(R \cap W \cap B') = 51$

(39)

I: Internet
T: television
N: newspapers

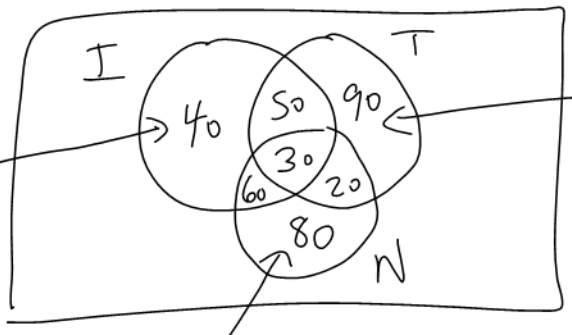




80-30

50-30

90-30



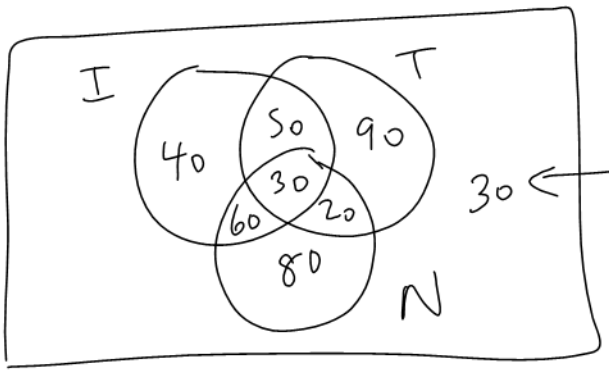
190-50-30-20

180-50-60-30

190-60-30-20

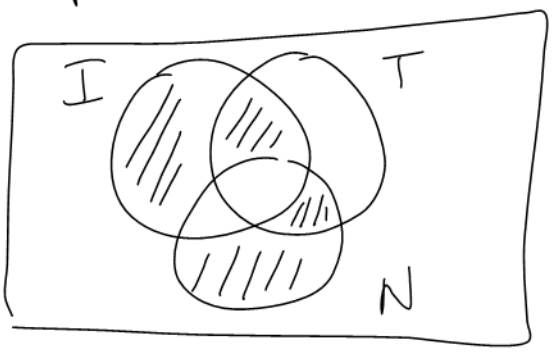
→

(39) Cont'd



$30 \leftarrow 400 - 40 - 50 - 90 - 60 - 30 - 20 - 80$

Newspapers or Internet, but not both:

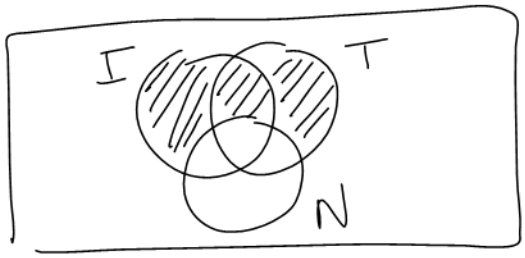


Could be written as $(I \cup N) \cap (I \cap N)'$

The number is $40 + 50 + 80 + 20 = 190$

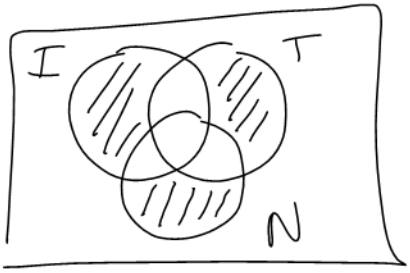
(41) $n((I \cup T) \cap N') = 40 + 50 + 90$

$= 180$



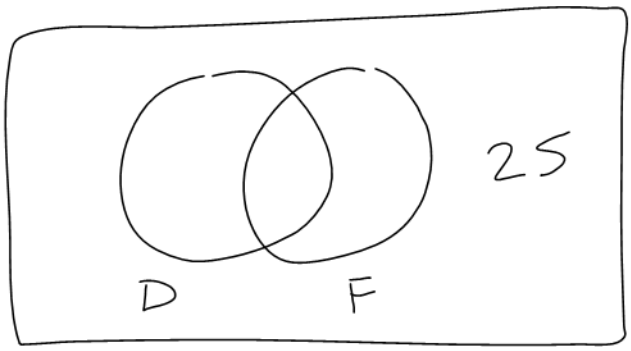
$(I \cup T) \cap N'$

(43) $40 + 90 + 80 = 210$



(51) D: Democrat

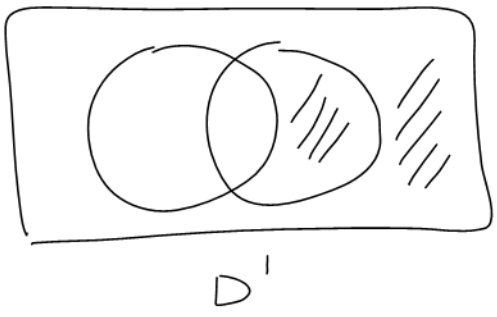
F: first-year

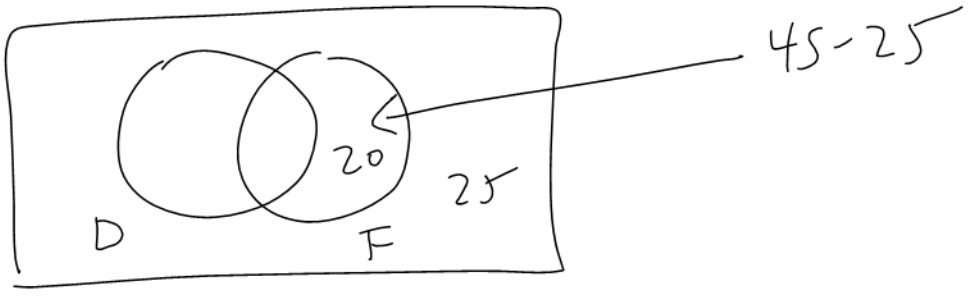


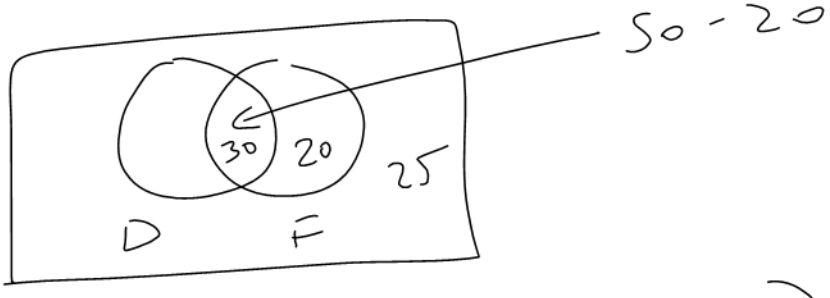
$n(D) = 55$

$n(D') = 100 - 55$

$= 45$



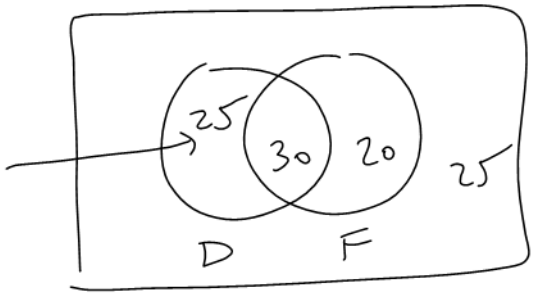




→

(51) Cont'd

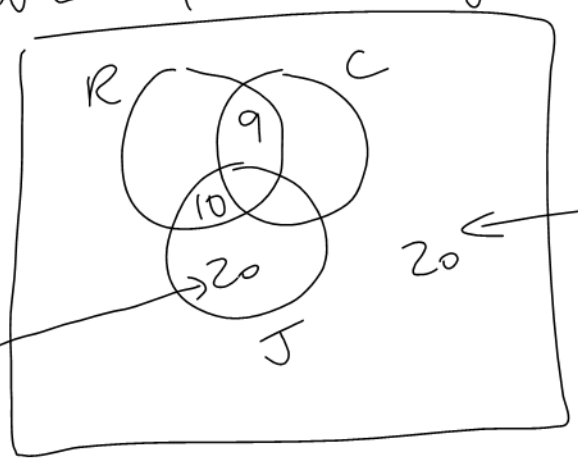
55 - 30



$n(D \cap F) = 30$

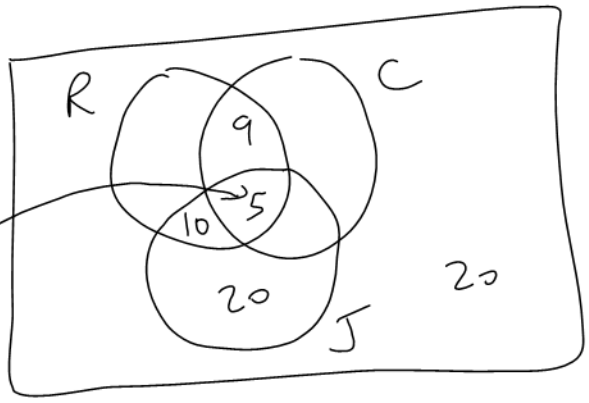
(61) R: rock
C: country
J: jazz

There are 4 basic regions we can fill in:

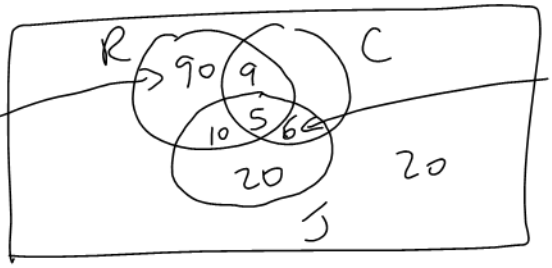


don't like any

jazz only

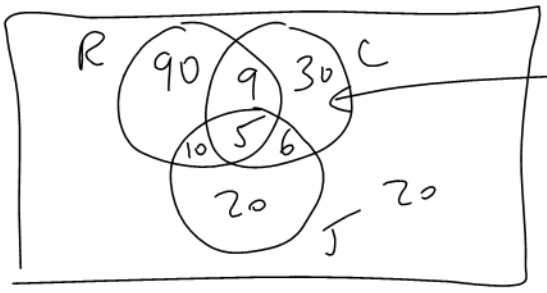


15-10



11-5

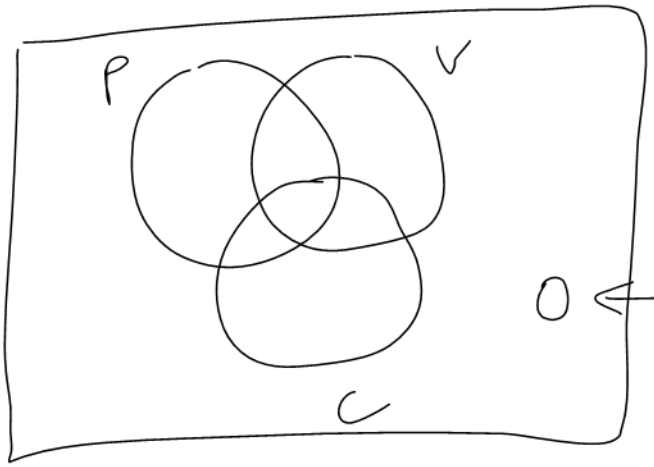
114-9-5-10



50-9-5-6

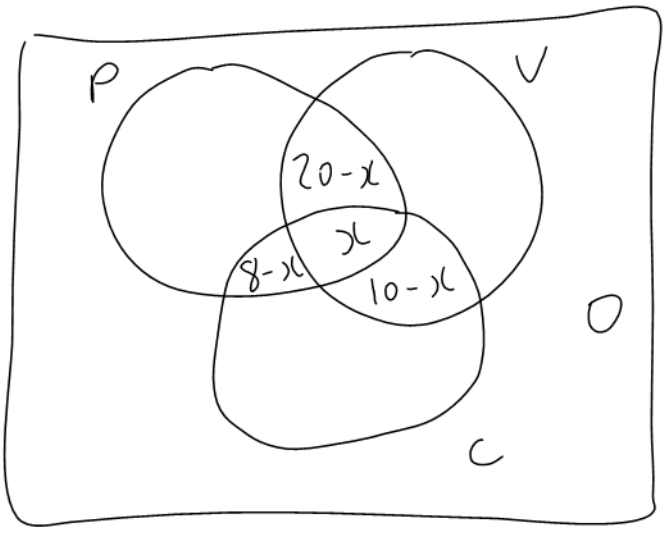
$n(R \cap C' \cap J') = 90$

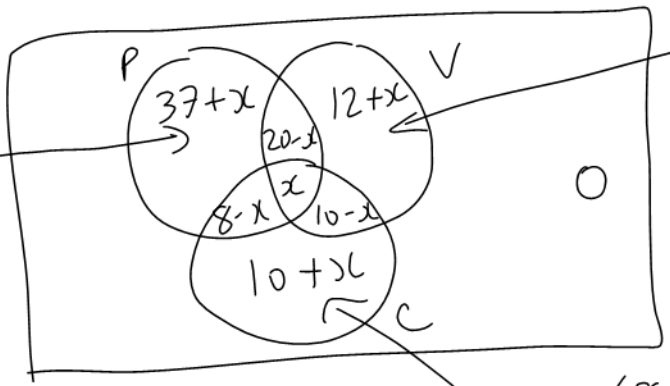
(71) P: piano
V: violin
C: clarinet



← no one plays none

Let x be the number who play all three.





$65-(20-x)-(8-x)-x$
$= 65-20+x-8+x-x$
$= 37+x$

$42-(20-x)-(10-x)-x$
$= 42-20+x-10+x-x$
$= 12+x$

$28-(8-x)-x-(10-x)$
$= 28-8+x-x-10+x$
$= 10+x$

→

(71) Cont'd

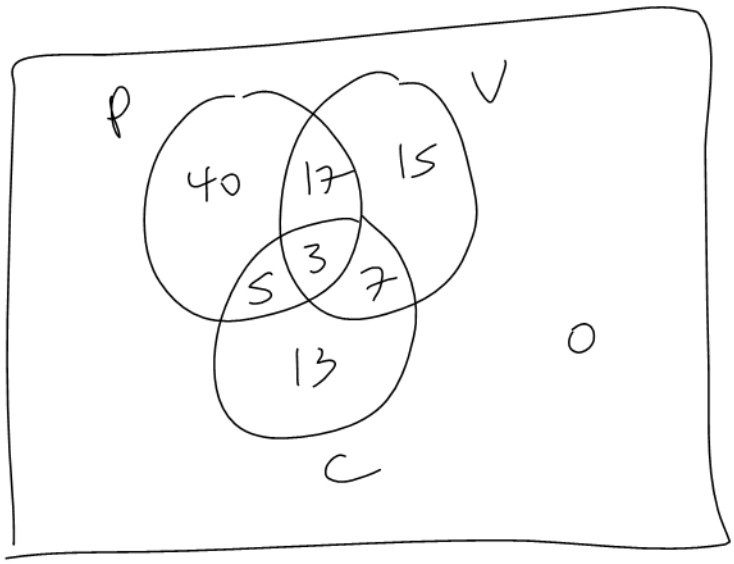
There are 100 students in total:

$$100 = (37+x)+(20-x)+(12+x)$$
$$+(8-x)+x+(10-x)+(10+x)+0$$

$$100 = 97 + x$$

$$3 = x$$

$$x = 3$$



3 students play all three.