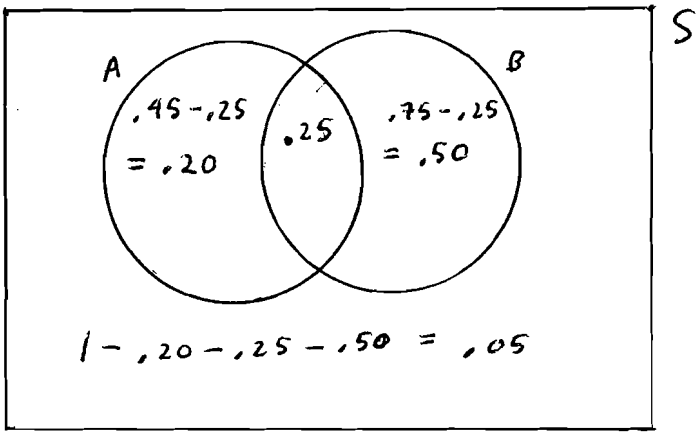
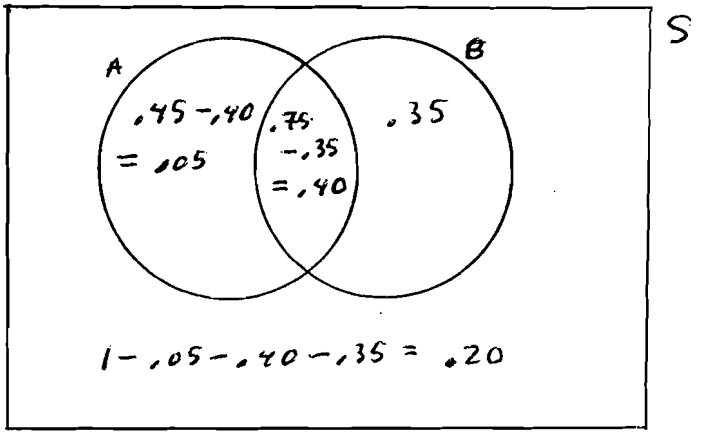
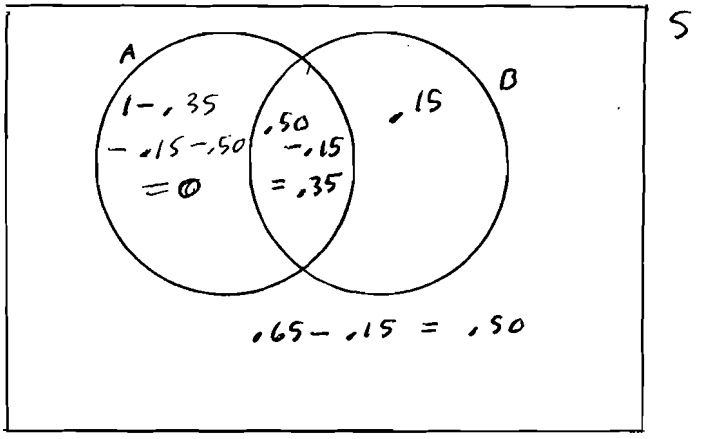
HW Section 3.1

bkm	Ans	Reason
1	(a) .20 (b) .50 (c) .05	
2	(a) .05 (b) .40 (c) .20	
3	(a) .35 (b) .50 (c) 1	

$Pr(A \cup B) = 0 + .35 + .15 = .50$

$Pr(B \cup A^{\prime}) = .15 + .35 + .50 = 1$

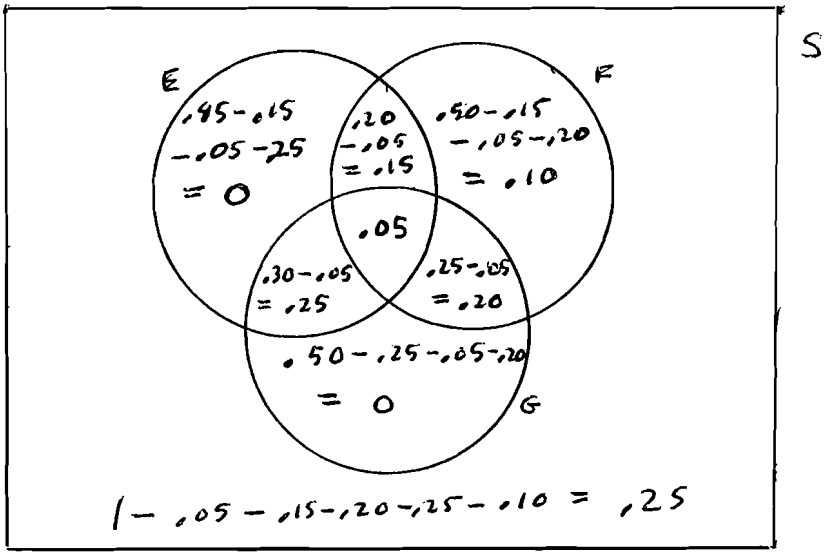
Problem	Ans	Reason
4	(a) .65	$A \cup B = B$ so $Pr(A \cup B) = Pr(B)$
	(b) .90	$Pr(A \cup B) = Pr(A) + Pr(B)$ $= .25 + .65$ $= .90$
	(c) .65	Same as (a)
5	(a) .55	$Pr(E \cup F) = Pr(E) + Pr(F) - Pr(E \cap F)$ $= .25 + .40 - .10$ $= .55$
	(b) .25	$Pr(F' \cap G) = Pr(G) - Pr(F \cap G)$ $= .55 - .30$ $= .25$
	(c) .40	$Pr(E' \cap G') = 1 - Pr(E \cup G)$ $= 1 - Pr(E) - Pr(G) + Pr(E \cap G)$ $= 1 - .25 - .55 + .20$ $= .40$

Problem	Ans	Reason
6	(a) .30	$Pr(E' \cap F) = Pr(F) - Pr(E \cap F)$ $= .45 - .15$ $= .30$
	(b) .90	$Pr(F \cup G) = Pr(F) + Pr(G) - Pr(F \cap G)$ $= .45 + .55 - .10$ $= .90$
	(c) .77	$Pr(E' \cup G) = 1 - Pr(E \cap G')$ $= 1 - Pr(E) + Pr(E \cap G)$ $= 1 - .35 + .12$ $= .77$
7	(a) .90	$Pr(E' \cup F) = Pr(F) + Pr(E' \cap F')$ $= Pr(F) + 1 - Pr(E \cup F)$ $= .50 + 1 - .60$ $= .90$
	(b) .20	$Pr(F' \cap G) = Pr(F \cup G) - Pr(F)$ $= .70 - .50$ $= .20$
	(c) .30	$Pr(E \cap G) = Pr(E) + Pr(G) - Pr(E \cup G)$ $= .35 + .45 - .50$ $= .30$

Problem	Ans	Reason

8 (a) 0

(b) .175



9 (a) 3/10

(b) 4/10

(c) 1/10

Abbreviate $b = Pr(B)$

Event E	A	B	C
Pr(E)	3b	b	6b

$1 = 3b + b + 6b$

$= 10b$

so $b = 1/10$

Event E	A	B	C
Pr(E)	$\frac{3}{10}$	$\frac{1}{10}$	$\frac{6}{10}$

Note $A \cap B = \phi$ so $A' \cap B = B$

Problem	Ans	Reason

10 .3

outcome	θ_1	θ_2	θ_3	θ_4
Pr	.1	$2x$	.3	x

Abbreviate $x = Pr(\theta_4)$

$$1 = .1 + 2x + .3 + x$$
$$= .4 + 3x$$
$$.6 = 3x$$
$$.2 = x$$

outcome	θ_1	θ_2	θ_3	θ_4
Pr	.1	.4	.3	.2

$$Pr[\theta_1, \theta_4] = .1 + .2 = .3$$

11 (a) .35

(b) 1

(c) .80

(d) .90

(e) .25

(f) 0

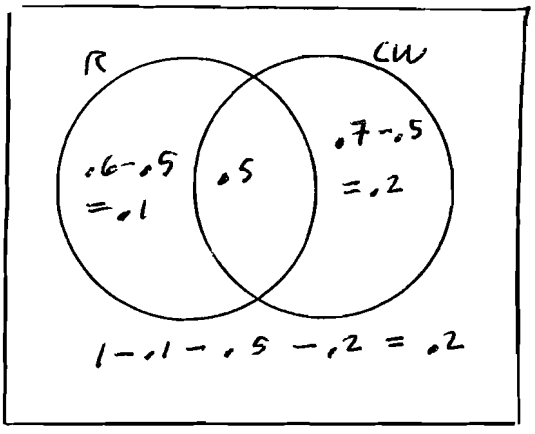
outcome	θ_1	θ_2	θ_3	θ_4	θ_5
Pr	.20	.10	.15	.45	.10

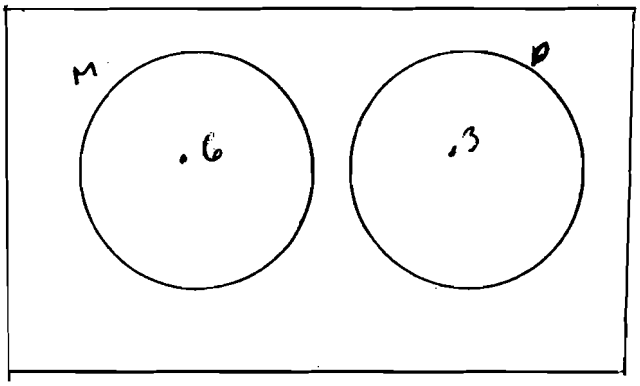
$$.20 + .15 = .35$$

$$1 - .20 = .80$$

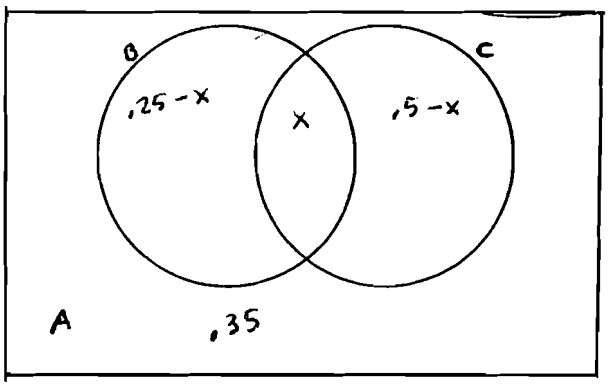
$$\{\theta_1, \theta_2, \theta_3\} \cup \{\theta_2, \theta_4\} = \{\theta_1, \theta_2, \theta_3, \theta_4\}$$

$$.10 + .15 = .25$$

Problem	Ans	Reason
12	(a) .45	Write $w_i = Pr(\theta_i)$ $i=1,2,3,4$
	(b) .15	$w_1 + w_2 + w_3 + w_4 = 1$
		$w_1 + w_3 = .55$
	(c) .70	$w_1 + w_2 + w_4 = .65$
		$w_2 - 2w_4 = 0$
		Solving this system we find
		$w_1 = .20$, $w_2 = .30$, $w_3 = .35$ $w_4 = .15$
		$Pr(E_1) = w_2 + w_4 = .45$
		$Pr(E_2) = w_4 = .15$
		$Pr(E_3) = w_1 + w_3 + w_4 = .70$
13	.2	
14	.1	

Problem	Ans	Reason
15	.6	

$M \cap D' = M$

16	(a) .60	
	(b) .65	
	(c) .10	

$1 = .35 + (.25 - x) + x + (.5 - x)$

$x = .10$

$Pr(A \cup B) = .35 + .25 = .60$

$Pr(B \cup C) = 1 - .35 = .65$

$Pr(B \cap C) = .10$

Problem	Ans

17 5/9

outcome	1	2	3	4	5	6
wt	2x	x	2x	x	2x	x

$1 = 2x + x + 2x + x + 2x + x$

$= 9x$

$x = 1/9$

$E = \{1, 3, 6\}$

$Pr(E) = \frac{2}{9} + \frac{2}{9} + \frac{1}{9} = \frac{5}{9}$

18 1/8

outcome	1	2	3	4	5
weight	2w	w	w	w	3w

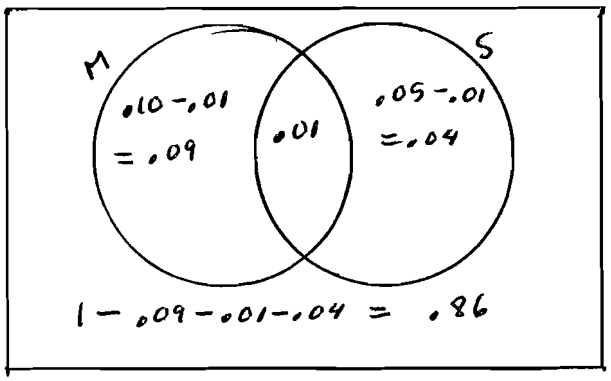
$(w = w_2)$

$1 = 2w + w + w + w + 3w$

$= 8w$

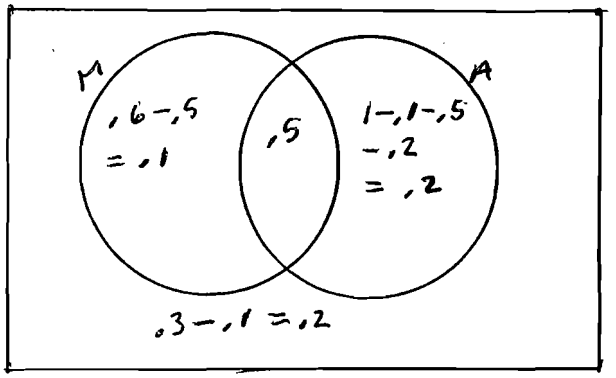
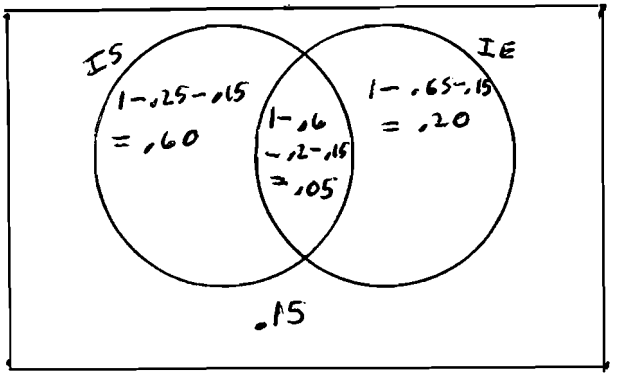
$w = 1/8$

19 .86



20 .13

$.09 + .04 = .13$

Problem	Ans	Reason
21	.8	 .1 + .5 + .2 = .8
22	.3	.1 + .2 = .3
23	.05	
24	$w_1 = .31$ $w_2 = .18$ $w_3 = .20$ $w_4 = .31$	$w_1 + w_2 = .49$ $w_1 + w_3 = .51$ $w_1 + w_2 + w_3 = .69$ $w_1 + w_2 + w_3 + w_4 = 1$ Solving the system $w_1 = .31$ $w_2 = .18$, $w_3 = .20$, $w_4 = .31$

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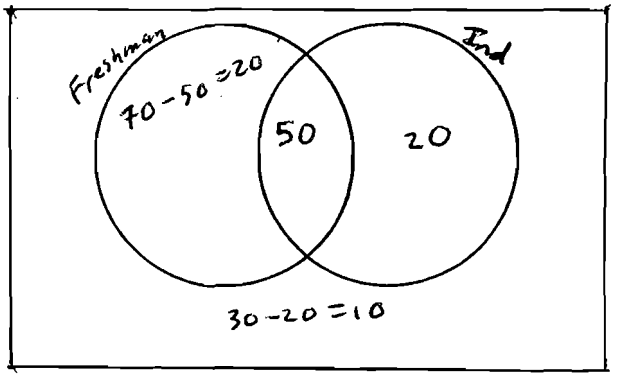
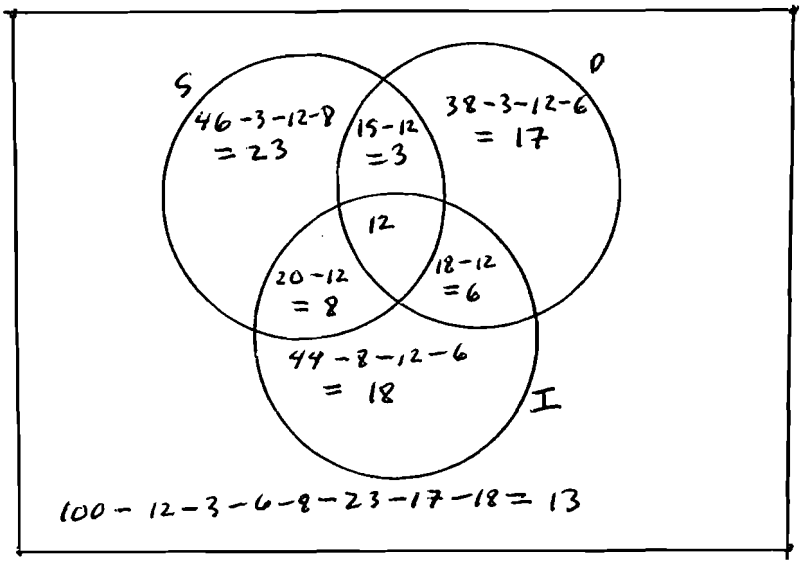
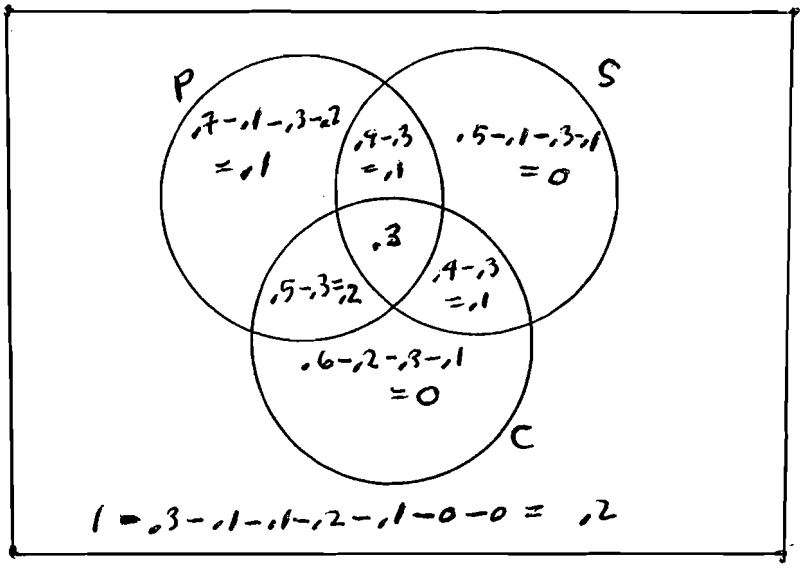
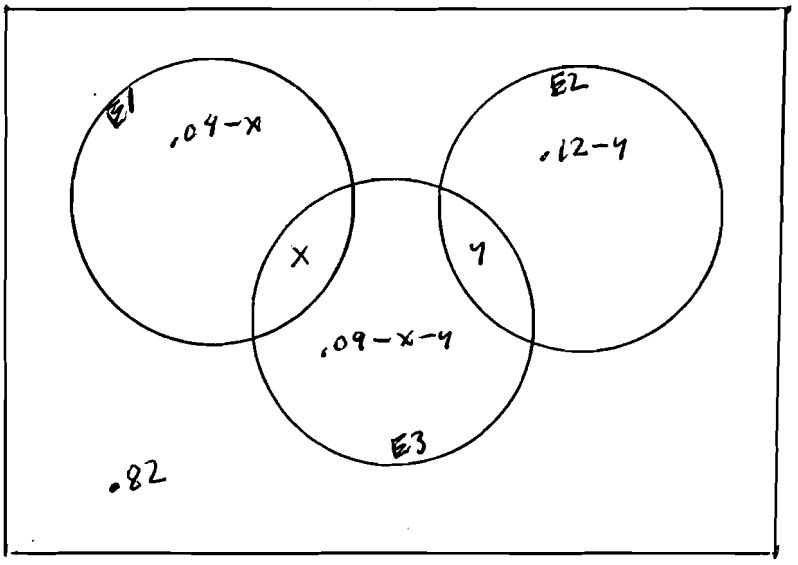
Problem	Ans	Reason
25	$\frac{30}{100}$	 70 out of 100 is Ind Res
26	(a) .58 (b) .13	 23+17+18 = 58

Problem	Ans	Reason
27	.1	

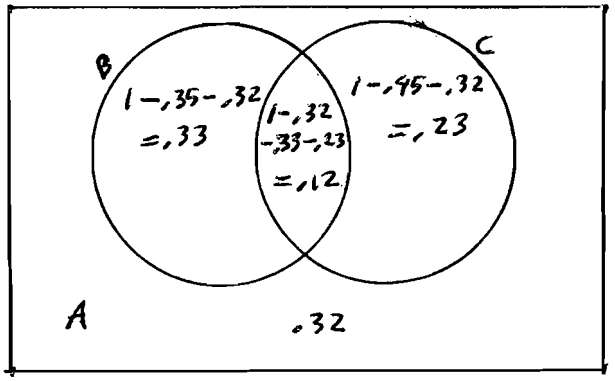
$.1 + 0 + 0 = .1$

28	(a)	.18	(= 1 − .82)
	(b)	.16	(= .04 + .12)
	(c)	.07	(= x+y)
	(d)	.02	(.09 − x − y)

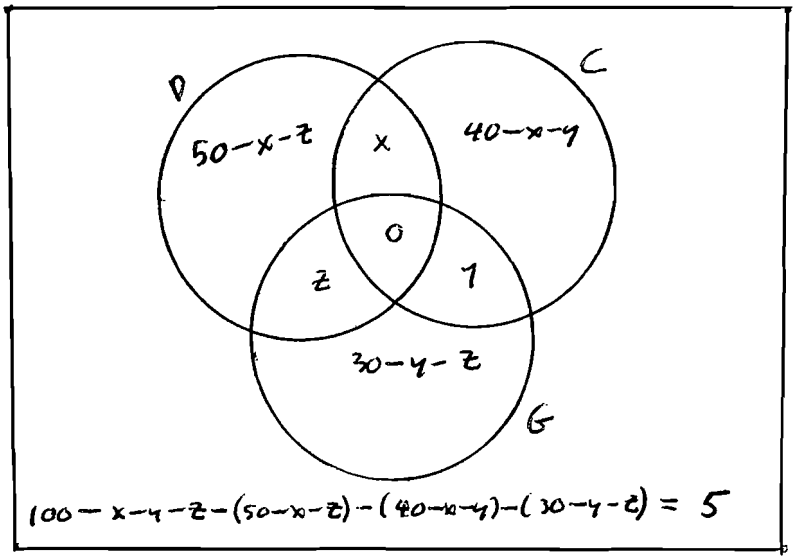


$1 = .82 + x + y + (.04 - x) + (.12 - y)$
$+ (.09 - x - y)$

$x + y = .07$

Problem	Ans	Reason
29	.88	

$.33 + .32 + .23 = .88$

30	5 out of 100 or $\frac{1}{20}$	

$x + y + z = 25$

31	$\pi = \left(1 + \frac{1}{2} + \frac{1}{3} + \cdots + \frac{1}{100}\right)^{-1}$	
32	$K = \left(1 + \frac{1}{2^2} + \frac{1}{3^2} + \cdots + \frac{1}{100^2}\right)^{-1}$	