① $A \cup B$ = 'La bola extraída es un nº par ó múltiplo de 3' $= \{2,3,4,6,8,9\}$

$A \cap B$ = 'La " " " " " " múltiplo de 3' $= \{6\}$

$\bar{A} \cup \bar{B}$ = '" " " o no es par o no es múltiplo de 3' $= \{1,2,3,4,5,7,8,9\}$

$\bar{A} \cap B$ = '" " " es par pero no múltiplo de 3' $= \{2,4,8\}$

② b)

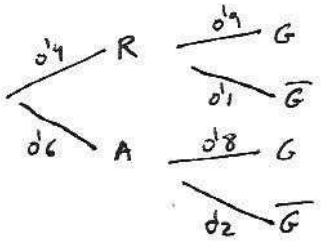
MAYOR	1	2	3	4	5	6
1	1	2	3	4	5	6
2	2	2	3	4	5	6
3	3	3	3	4	5	6
4	4	4	4	4	5	6
5	5	5	5	5	5	6
6	6	6	6	6	6	6

a) $U = \{1,2,3,4,5,6\}$

c) $P(1) = \frac{1}{36}$; $P(2) = \frac{3}{36}$; $P(3) = \frac{5}{36}$

$P(4) = \frac{7}{36}$; $P(5) = \frac{9}{36}$; $P(6) = \frac{11}{36}$

③



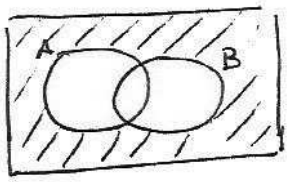
a) $P(R \cap G) = 0'4 \cdot 0'9 = 0'36$

b) $P(G) = 0'4 \cdot 0'9 + 0'6 \cdot 0'8 = 0'36 + 0'48 = 0'84$

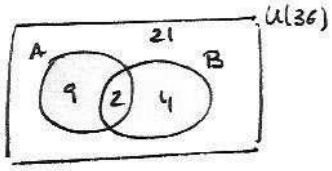
c) $P(R/G) = \frac{P(R \cap G)}{P(G)} = \frac{0'36}{0'84} = \frac{36}{84} = \frac{3}{7}$

④

a)



b)



$36 - 21 = 15$

$11 + 6 - 15 = 2$

$11 - 2 = 9$

$6 - 2 = 4$

$n(A \cap B) = 2$

$P(A \cap B) = \frac{2}{36} = \frac{1}{18}$

c) Como $P(A \cap B) \neq 0 \Rightarrow$ A y B no son mutuamente excluyentes

⑤

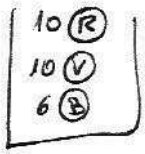
SUMA	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

a) $P(E) = \frac{6}{36} = \frac{1}{6}$

b) $P(F) = \frac{3}{36} = \frac{1}{12}$

c) $P(E \cup F) = \frac{8}{36} = \frac{2}{9}$

⑥



$$P = P[(R_1 \cap \bar{R}_2) \cup (V_1 \cap \bar{V}_2) \cup (B_1 \cap \bar{B}_2)] =$$
$$= \frac{10}{26} \cdot \frac{16}{25} + \frac{10}{26} \cdot \frac{16}{25} + \frac{6}{26} \cdot \frac{20}{25} = \frac{440}{650} = \frac{44}{65}$$

⑦

a) $P(A \cap T_2) = \frac{80}{210} = \frac{8}{21}$

$P(A \cap B) = \frac{35}{210} = \frac{7}{42} = \frac{1}{6}$

$P(A) \cdot P(B) = \frac{80}{210} \cdot \frac{100}{210} \neq \frac{1}{6} = P(A \cap B) \Rightarrow$ A, B son dependientes

También: $P(A/B) = \frac{P(A \cap B)}{P(B)} = \frac{35/210}{100/210} = \frac{35}{100} \neq P(A) \Rightarrow$ A, B son dependientes

b) $P(1^{er}$ curso / Historia$) = \frac{50}{85} = \frac{10}{17}$

c) $P = P[(1° \cap 2°) \cup (2° \cap 1°)] = \frac{110}{210} \cdot \frac{100}{209} + \frac{100}{210} \cdot \frac{110}{209} = 2 \, \frac{110 \cdot 100}{210 \cdot 209} = \frac{200}{399}$

(8)

a) $U = \{AA, AB, AC, BA, BB, BC, CA, CB, CC\}$

Todos los sucesos son equiprobables porque los 3 sectores son iguales.

b) $P(AA \cup BB \cup CC) = \frac{3}{9} = \frac{1}{3}$

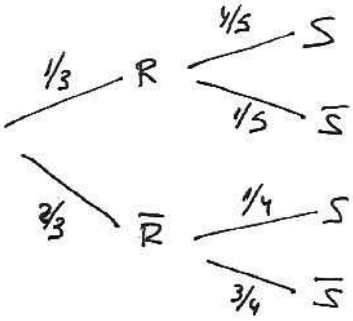
$P(AA \cup AB \cup AC \cup BA \cup CA) = \frac{5}{9}$

$P(AA) = \frac{1}{9}$

$P(AA \cup AB \cup AC \cup BA \cup BB \cup CA \cup CC) = \frac{7}{9}$

(9)

a)



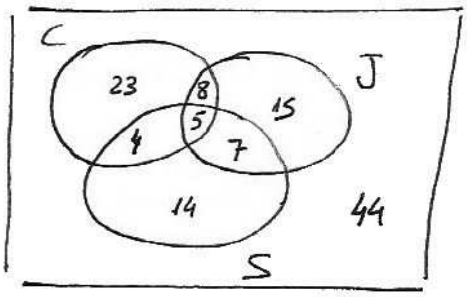
b) $P(R \cap S) = \frac{1}{3} \cdot \frac{4}{5} = \frac{4}{15}$

$P(S) = \frac{1}{3} \cdot \frac{4}{5} + \frac{2}{3} \cdot \frac{1}{4} = \frac{4}{15} + \frac{2}{12} =$

$= \frac{4}{15} + \frac{1}{6} = \frac{13}{30}$

$P(R/S) = \frac{P(R \cap S)}{P(S)} = \frac{4/15}{13/30} = \frac{8}{13}$

(10)



$40 - (8+5+4) = 23$

$35 - (8+5+7) = 15$

$30 - (4+5+7) = 14$

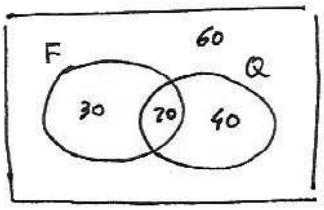
$120 - (23+8+5+4+7+15+14) = 44$

a) $P = \frac{4+8+7}{120} = \frac{19}{120}$

b) $P = \frac{15}{120} = \frac{1}{8}$

c) $P = \frac{44}{120} = \frac{11}{30}$

(11)



a) $P(F/Q) = \frac{P(F \cap Q)}{P(Q)} = \frac{20/150}{60/150} = \frac{1}{3}$

b) $P(F/\overline{Q}) = \frac{P(F \cap \overline{Q})}{P(\overline{Q})} = \frac{30/150}{90/150} = \frac{1}{3}$

c) $P(F \cap Q) \neq 0 \Rightarrow$ F, Q no son mutuamente excluyentes

$P(F/Q) = P(F/\overline{Q}) \Rightarrow$ F, Q son independientes

También: $P(F \cap Q) = \frac{20}{150} = \frac{50}{150} \cdot \frac{60}{150} = P(F) \cdot P(Q) \Rightarrow$ F, Q son independientes

(12)

a) $P(E \cap F) = P(E) \cdot P(F)$

$\frac{1}{3} = \frac{2}{3} \cdot P(F) \Rightarrow P(F) = \frac{1}{2}$

b) $P(E \cup F) = P(E) + P(F) - P(E \cap F) = \frac{2}{3} + \frac{1}{2} - \frac{1}{3} = \frac{5}{6}$

(13) a) $P(\overline{B}) = \frac{1}{4} \Rightarrow P(B) = \frac{3}{4}$

b) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$\frac{7}{8} = \frac{2}{5} + \frac{3}{4} - P(A \cap B) \Rightarrow P(A \cap B) = \frac{2}{5} + \frac{3}{4} - \frac{7}{8} = \frac{16+30-35}{40} = \frac{11}{40}$

c) $P(A|B) = \frac{P(A \cap B)}{P(B)} = \frac{11/40}{3/4} = \frac{11}{30}$

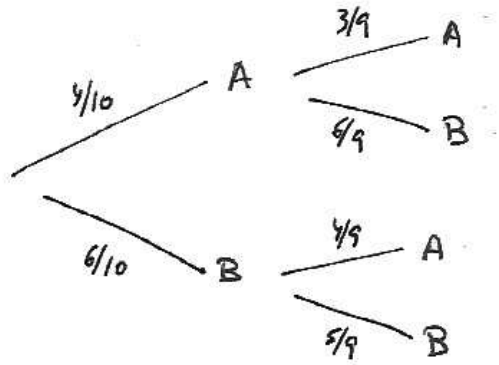
(14) a) $P = \frac{46}{97}$

b) $P(V/M_u) = \frac{13}{51}$

c) $P(V \cup H) = \frac{59}{97}$

	M	A	V	
H	21	16	9	46
Mu	19	19	13	51
	40	35	22	97

(15) a)



b) $P = \frac{4}{10} \cdot \frac{6}{9} + \frac{6}{10} \cdot \frac{4}{9} = \frac{48}{90} = \frac{24}{45} = \frac{8}{15}$

(16) a) $P(A) = \frac{1}{11}$

b) $P(B|A) = \frac{2}{10}$

c) $P(A \cap B) = \frac{1}{11} \cdot \frac{2}{10} = \frac{2}{110} = \frac{1}{55}$

(21) $A \cup B$ = "La carta extraída es o un cinco o de copas" ← 13 cartas

$A \cap B$ = " " " " el cinco de copas" ← 1 "

$\bar{A} \cup \bar{B}$ = " " " " o no es un cinco o no es de copas" ← 39 cartas

$\bar{A} \cap B$ = " " " " es un cinco pero no de copas" ← 3 cartas

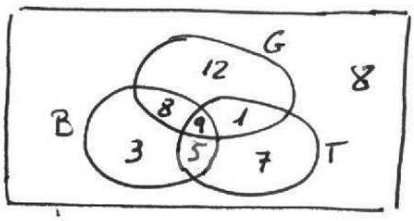
(22)

RESTA	1	2	3	4	5	6
1	0	1	2	3	4	5
2	1	0	1	2	3	4
3	2	1	0	1	2	3
4	3	2	1	0	1	2
5	4	3	2	1	0	1
6	5	4	3	2	1	0

a) $\boxed{E = \{0,1,2,3,4,5\}}$

c) $P(0) = \frac{6}{36}$; $P(1) = \frac{10}{36}$; $P(2) = \frac{8}{36}$; $P(3) = \frac{6}{36}$; $P(4) = \frac{4}{36}$; $P(5) = \frac{2}{36}$

(23)



$n(B \cap G \cap T) = 9$

$n(B \cap \bar{G} \cap T) = 14 - 9 = 5$

$n(B \cap G \cap \bar{T}) = 17 - 9 = 8$

$n(\bar{B} \cap G \cap T) = 10 - 9 = 1$

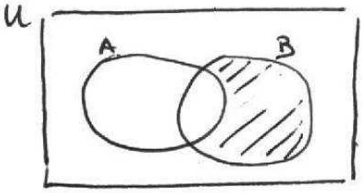
$n(B \cap \bar{G} \cap \bar{T}) = 25 - 8 - 9 - 5 = 3$

$n(\bar{B} \cap G \cap \bar{T}) = 30 - 8 - 9 - 1 = 12$

$n(\bar{B} \cap \bar{G} \cap T) = 22 - 5 - 9 - 1 = 7$

$n(\bar{B} \cap \bar{G} \cap \bar{T}) = 53 - 3 - 8 - 9 - 5 - 1 - 7 - 12 = 8$

(24)



$n(B \cap \bar{A}) = n(A \cup B) - n(A) = 65 - 30 = \boxed{35}$

$P(B \cap \bar{A}) = \frac{35}{100} = \boxed{0'35}$

(25)

a) $P(A \cap B) = P(A) \cdot P(B) = \boxed{0'6x}$

b) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

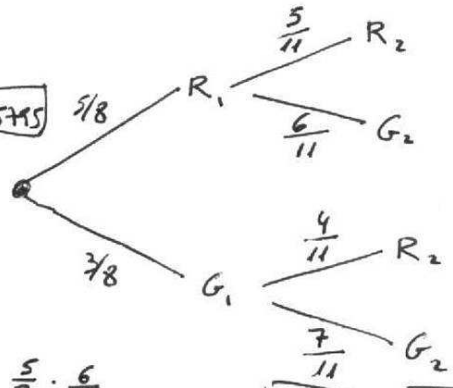
$0'8 = 0'6 + x - 0'6x$

$0'2 = 0'4x \Rightarrow \boxed{x = 0'5}$

c) $P(A \cap B) = 0'6 \cdot 0'5 = \boxed{0'3}$

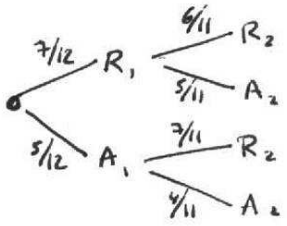
(26)

b) $P(G_2) = \frac{5}{8} \cdot \frac{6}{11} + \frac{3}{8} \cdot \frac{7}{11} = \boxed{\frac{51}{88}} = \boxed{0'5795}$

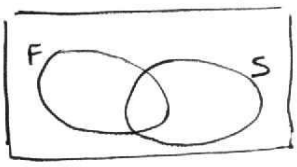


c) $P(R_1 / G_2) = \frac{P(G_2 \cap R_1)}{P(G_2)} = \frac{\frac{5}{8} \cdot \frac{6}{11}}{\frac{5}{8} \cdot \frac{6}{11} + \frac{3}{8} \cdot \frac{7}{11}} = \boxed{\frac{30}{51}} = \boxed{0'5882}$

(27) $P(\text{mismo color}) = \frac{7}{12} \cdot \frac{6}{11} + \frac{5}{12} \cdot \frac{4}{11} = \frac{62}{132} = \boxed{\frac{31}{66}} = \boxed{0'4697}$



(28)



a) $N = \overline{F} \cap \overline{S}$

$P(F \cup S) = 1 - 0'14 = 0'86$

$P(F \cap S) = -P(F \cup S) + P(F) + P(S) = -0'86 + 0'31 + 0'62 = \boxed{0'07}$

b) $P(F/S) = \dfrac{P(F \cap S)}{P(S)} = \dfrac{0'07}{0'62} = \boxed{\dfrac{7}{62}}$

c) $\left.\begin{array}{l} P(F \cap S) = 0'07 \\ P(F) \cdot P(S) = 0'31 \cdot 0'62 \end{array}\right\}$ Son distintos $\Rightarrow$ $\boxed{F \text{ y } S \text{ no son independientes}}$

d) • $P(N) = 0'14 \Rightarrow P(F \cup S) = 1 - 0'14 = 0'86$

• doble clientes de ensalada que de pescado $\Rightarrow P(S) = 2 \cdot P(F)$

• F y S independientes $\Rightarrow P(F \cap S) = P(F) \cdot P(S)$

$\Rightarrow$

$P(F \cup S) = P(F) + P(S) - P(F \cap S)$

$0'86 = P(F) + 2P(F) - P(F) \cdot 2P(F)$

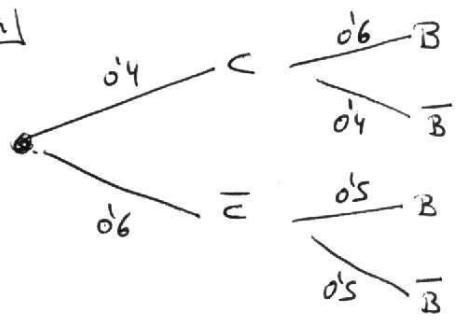
$0'86 = 3P(F) - 2P^2(F)$

$t = P(F)$, $\quad 0'86 = 3t - 2t^2$

$2t^2 - 3t + 0'86 = 0$

$t = \dfrac{3 \pm \sqrt{9 - 6'88}}{4} = \dfrac{3 \pm \sqrt{1'12}}{4}$ $\nearrow$ $\cancel{1'46}$; $\searrow$ $0'4854 \Rightarrow \boxed{P(F) = 0'49}$

(29) a)



b) $P(B) = 0'4 \cdot 0'6 + 0'6 \cdot 0'5 = \boxed{0'54}$

c) $P(C/B) = \dfrac{P(C \cap B)}{P(B)} = \dfrac{0'4 \cdot 0'6}{0'54} = \dfrac{0'24}{0'54} =$

$= \dfrac{24}{54} = \dfrac{12}{27} = \boxed{\dfrac{4}{9}} = \boxed{0'\widehat{4}}$

(30) a) $P(\dot{10}) = \dfrac{9}{90} = \boxed{0'1}$ $\quad$ ($\dot{10}$: 10, 20, 30, 40, 50, 60, 70, 80, 90)

$\uparrow$ múltiplo de 10

b) $P(\dot{10} \cup \dot{15}) = \dfrac{12}{90} = \boxed{\dfrac{2}{15}} = \boxed{0'\widehat{13}}$

$\dot{10} = 10, 20, \boxed{30}, 40, 50, \boxed{60}, 70, 80, \boxed{90}$ $\leftarrow$ Son 9

$\dot{15} = 15, \boxed{30}, 45, \boxed{60}, 75, \boxed{90}$ $\leftarrow$ Son 6

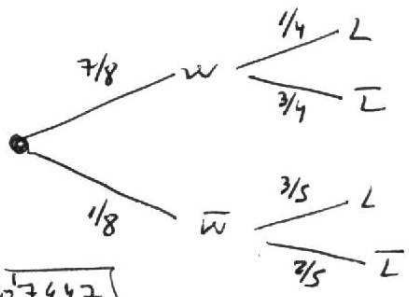
3 repetidos

$15 - 3 = 12$ ✓

(31)

b) $P(L) = \dfrac{7}{8} \cdot \dfrac{1}{4} + \dfrac{1}{8} \cdot \dfrac{3}{5} = \dfrac{7}{32} + \dfrac{3}{40} =$

$= \dfrac{35 + 12}{160} = \boxed{\dfrac{47}{160}} = \boxed{0'2938}$



c) $P(W/L) = \dfrac{P(W \cap L)}{P(L)} = \dfrac{\frac{7}{8} \cdot \frac{1}{4}}{47/160} = \dfrac{\frac{7}{32}}{47/160} = \boxed{\dfrac{35}{47}} = \boxed{0'7447}$

(32)

a) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$$\frac{7}{8} = \frac{1}{2} + \frac{3}{4} - P(A \cap B)$$

$$P(A \cap B) = \frac{1}{2} + \frac{3}{4} - \frac{7}{8} = \frac{4+6-7}{8} = \boxed{\frac{3}{8}} = \boxed{0'375}$$

b) $P(A/B) = \dfrac{P(A \cap B)}{P(B)} = \dfrac{3/8}{3/4} = \dfrac{3}{6} = \boxed{\dfrac{1}{2}} = \boxed{0'5}$

c) $P(A \cap B) = \dfrac{3}{8}$

$P(A) \cdot P(B) = \dfrac{1}{2} \cdot \dfrac{3}{4} = \dfrac{3}{8}$ $\Rightarrow$ $\boxed{\text{A y B son independientes}}$

(33)

a) $P(R_3 / V_1 \cap V_2) = \boxed{\dfrac{22}{23}} = \boxed{0'9565}$

b) $P(\text{dos Rojas}) = P\{(R_1 \cap R_2 \cap V_3) \cup (R_1 \cap V_2 \cap R_3) \cup (V_1 \cap R_2 \cap R_3)\} =$

$$= \frac{22}{25} \cdot \frac{21}{24} \cdot \frac{3}{23} + \frac{22}{25} \cdot \frac{3}{24} \cdot \frac{21}{23} + \frac{3}{25} \cdot \frac{22}{24} \cdot \frac{21}{23} =$$

$$= 3 \cdot \frac{22}{25} \cdot \frac{21}{24} \cdot \frac{3}{23} = \boxed{\frac{693}{2300}} = \boxed{0'301}$$

(34)

a)

	3	4	5
9	3,9	4,9	5,9
10	3,10	4,10	5,10
10	3,10	4,10	5,10

b)

SUMA	3	4	5
9	12	13	14
10	13	14	15
10	13	14	15

$S = \{12, 13, 14, 15\}$

c) $P(12) = \dfrac{1}{9}$ $\quad P(13) = \dfrac{3}{9}$ $\quad P(14) = \dfrac{3}{9}$ $\quad P(15) = \dfrac{2}{9}$

d) $E(S) = 12 \cdot \dfrac{1}{9} + 13 \cdot \dfrac{3}{9} + 14 \cdot \dfrac{3}{9} + 15 \cdot \dfrac{2}{9} = \dfrac{41}{3} = \boxed{13'\widehat{6}}$

e) $P(\text{par}) = \dfrac{1}{9} + \dfrac{3}{9} = \dfrac{4}{9}$; $P(\text{impar}) = \dfrac{3}{9} + \dfrac{2}{9} = \dfrac{5}{9}$ $\Rightarrow$ $\dfrac{5}{9} \times 30 + \dfrac{4}{9} \times 50 = 38'\widehat{8}$ \$

36 juegos $\Rightarrow$ $36 \times 38'\widehat{8} = \boxed{1400 \text{ \$}}$

(35)

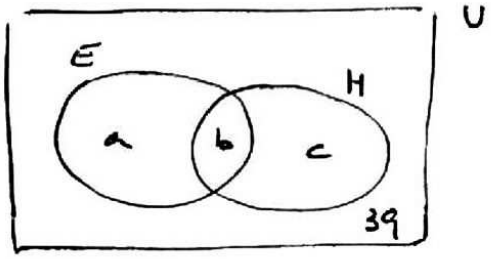
	Foot	T	H	
F	5	3	3	11
M	4	2	3	9
	9	5	6	20

a) i) $P(M \cap T) = \dfrac{12}{20} = \dfrac{3}{5} = \boxed{0'6}$

ii) $P(\overline{\text{Foot}}/F) = \dfrac{P(\overline{\text{Foot}} \cap F)}{P(F)} = \dfrac{6/20}{11/20} = \boxed{\dfrac{6}{11}} = 0'\widehat{54}$

b) $P = \dfrac{11}{20} \cdot \dfrac{10}{19} = \boxed{\dfrac{11}{38}} = \boxed{0'2895}$

(36) a)



$m(E \cup H) = 88 - 39 = 49$

$m(E \cap H) = m(E) + m(H) - m(E \cup H) =$
$= 32 + 28 - 49 = 11$

$a = 32 - 11 = \boxed{21}$

$b = \boxed{11}$

$c = 28 - 11 = \boxed{17}$

b) i) $P(E \cap H) = \frac{11}{88} = \boxed{\frac{1}{8}} = \boxed{0'125}$

ii) $P(\overline{H}/E) = \frac{P(\overline{H} \cap E)}{P(E)} = \frac{21/88}{32/88} = \boxed{\frac{21}{32}} = \boxed{0'6563}$

c) $P = \frac{56}{88} \cdot \frac{55}{87} \cdot \frac{54}{86} = \boxed{\frac{315}{1247}} = \boxed{0'2526}$

d) $P = 1 - \frac{56}{88} \cdot \frac{55}{87} \cdot \frac{54}{86} = \boxed{\frac{932}{1247}} = \boxed{0'7474}$

(37) a) $P(A) = \frac{90}{360} = \frac{1}{4}$

$P(B) = \frac{120}{360} = \boxed{\frac{1}{3}} = \boxed{0'\overline{3}}$

$P(C) = \frac{150}{360} = \frac{5}{12}$

b) $P(S) = \frac{1}{4} + \frac{1}{3} = \boxed{\frac{7}{12}} = \boxed{0'58\overline{3}}$

c) $P(A/S) = \frac{P(A \cap S)}{P(S)} = \frac{90/360}{7/12} = \boxed{\frac{3}{14}} = \boxed{0'2143}$