2.1
Given that P(A) = 2/3, P(B) = 1/6, P(A∩B) = 1/9, what is P(AUB)?

We know that P(AUB) = P(A) + P(B) - P(A∩B).
So P(AUB) = 2/3 + 1/6 – 1/9 = 9/18 + 3/18 – 2/18 = 10/18 = 5/9

2.2
The probability that at least one of E or F occurs, P(E U F) = ¾. We wish to find
We wish to find the probability that neither E nor F occurs, i.e. P(E' ∩ F').
By deMorgan's Law, E' ∩ F' = (E U F)' = 1-P(E U F) = 1 – ¾ = ¼.

2.4
The probability that of A, B, and C, A alone occurs = P(A∩(B'∩C'))
=P((A' U B U C)') deMorgan's law
=1 – P(A' U (B U C)) (since P(E') = 1-P(E)
=1 – [P(A') + P(B U C) – P(A' ∩ (B U C)] probability of an "or"
(*) = P(A) + P(A' ∩ (B U C)) – P(B U C) (replacing P(A') with 1-P(A) and rearranging
Now, A and A' are clearly disjoint, and therefore A and A'∩ (B U C) must also be disjoint. Furthermore, A U A' is the entire sample space, so we can write
P(A U B U C) = P((A U A') ∩ (A U B U C)) = P(A U [A' ∩ (B U C)])
= P(A) + P(A' ∩ (B U C).
Substituting this into (*), we get
P(A∩B'∩C') = P(A U B U C) – P(B U C). Finally, since
P(B U C) = P(B) + P(C) – P(B∩C), we end up with
P(A∩B'∩C') = P(A U B U C) – P(B) – P(C) + P(B∩C)

2.9
A: throw tails exactly 2 times: HTT THT TTH
B: throw tails at least 2 times: HTT THT TTH TTT
C: tails did not appear before a head appeared: HHH HTH HHT HTT
D: first result is a tail: THH THT TTH TTT

2.13:
Could get:
a,b a,c a,d
b,a b,c b,d
c,a c,b c,d
d,a d,b d,c

	a	b	c	d
a	0	1/12	1/12	1/12
b	1/12	0	1/12	1/12
c	1/12	1/12	0	1/12
d	1.12	1.12	1.12	0