Arts/ Sci 2R06 Assignment 4

4.2

E_1	E_2	E_3	E_4	E_5
0.15	0.15	0.40	0.20	0.10

a. Since P(s)= 1, and $P(E_1)+P(E_2)+P(E_3)+P(E_4)+P(E_5)= 1$,
So, $0.15+0.15+0.40 +2P(E_5)+P(E_5)= 1$,
$0.7+3E_5=1 \Rightarrow 3E_5=1-0.70 \Rightarrow 3E_5=0.3$
$E_5=0.10$

b. $A=\{E_1, E_3, E_4\}$, P(A)= 0.15+0.4+0.20 = 0.75
$B= \{E_2, E_3\}$, P(B)=0.15+0.40= 0.55

c. Simple events: $\{E_1. E_2, E_3, E_4\}$

d. Simple events: $\{E_3\}$

4.9

	Used Eyeglasses for Reading	
Judged to Need Eyeglasses	Yes	No
Yes	0.44	0.14
No	0.02	0.40

The four possible outcomes of the experiment, or simple events, are represented as the cells of a 2X2 table, and have probabilities as given in the table.

a. P(adult judged t need glasses) = 0.14+ 0.44 = 0.58
b. P(adult needs glasses but does not use them) = 0.14
c. P(adult uses glasses) = 0.44+0.02 = 0.46

4.29

a. Each students has a choice of 52 cards, since the cards are replaced between selections. The m x n rule allows you to find the total number of configurations for three students as (52)(52)(52) = 140,608

b. Now each student must pick a different card. That is, the first student has 52 choices, but the second and third students have only 51 and 50 choices, respectively. The total number of configurations i found using the mn Rule on the rule for permutations: (52)(51)(50) = 132 600

c. Let A be the event of interest. Since there 52 different cards in the deck, there are 52 configurations in which all three students pick the same card (one for each card). That is, there 52 ways for the event A to occur, out of a total of N= 140,608 possible configurations from part a. The probability of interest is P(A)= 52/ 140,608 = 0.00037

d. Again, let A be the event of interest. There are 132,600 ways (from part b) for the event A occur, out of a total of N = 140,608 possible configurations from part a, and the probability of interest is P(A) = 132,600/140,608 =0.943

4.54

a) P(a nonusers fails both tests) = 0.02X0.02= 0.0004
b) P(a drug user is detected) = (.98)(.98)+(.98)(.02)+(.02)(.98)=0.9996
c) P(a drug user passes both tests) = 0.0004

4.56

Let C be convicted, NC be not convicted.
Here are the events of interest: A = the offender has 10 or more years of education.
B = the offender is convicted within 2 years after completion of treatment.

a) $P(A) = 0.1+0.3 = 0.4$
b) $P(B) = 0.1+0.27 = 0.37$
c) $P(A\cap B) = 0.1$
d) $P(A\cup B) = P(A) + P(B) - P(A\cap B) = 0.4+0.37-0.1 = 0.67$
e) $P(A^C) = 1 - P(A) = 0.6$
f) $P\{(A\cup B)^C\} = 1 - P(A\cup B) = 1-0.67 = 0.33$
g) $P\{(A\cap B)^C\} = 1 - P(A\cap B) = 1-0.1 = 0.9$
h) $P(A|B) = P(A\cap B)/P(B) = 0.1/0.37 = 0.27$
i) $P(B|A) = P(A\cap B)/P(A) = 0.1/0.4 = 0.25$

4.60

	Starbucks (S)	Peetes (P)	Total
Café Mocha (M)	0.42	0.18	0.60(given)
Other (M^c)	0.28	0.12	0.40
Total	0.70 (given)	0.30(given)	1.00

a. $P(S\cap M) = (0.7)(0.6) = 0.42$
b. Yes, they are independent events, because $P(S|M) = P(S\cap M)/P(M) = 0.42/0.6 = 0.7$ and $P(S) = 0.7$, Since $P(S|M) = P(S)$, means that the probability of S does not change given M. Therefore, they are independent.
c. $P(P|M) = P(P\cap M)/P(M) = (0.3)(0.6)/(0.6) = 0.3$
d. $P(S\cup M) = P(S) + P(M) - P(S\cap M) = 0.7 + 0.6 - 0.42 = 0.88$

4.62

P(Smokers)=0.2 , P(Non-Smoker)=0.80, and we denote the Chance of dying of Lung cancer if nonsmoker: L .Based on question, the probability of death due to lung cancer, given that a person smoked, was roughly 10 times the probability of death due to lung cancer, we denote the chance of dying of Lung cancer if smoker as10L .
We are given the percent of People Who die because of lung cancer is 0.006, so we can write 0.2(10L)+0.8(L)=0.006 => 2.8L=0.006=>L= 0.00214
so the probability of death due to lung cancer given that a person is a smoker:
0.00214x10 = 0.0214