A+

Sec2Ex

46.

$$P(A|B)=\frac{P(A\cap B)}{P(B)}$$

$$P(B|A)=\frac{P(A\cap B)}{P(A)}$$

I think P(A) the percentage of male American over 6ft selected randomly is higher than P(B) that the ratio of basketball player. Thus I think P(A|B)>P(B|A).

50.

a. .05

b. Ls:Long-sleeved Ss::Short-sleeved

$$P(Ls)+P(Ss)=1$$
$$P(Ls\cap Ss)=\phi$$
$$\Rightarrow P\,(M\cap \Pr)$$
$$=P(M\cap \Pr|Ls)P(Ls)+P(M\cap \Pr|Ss)P(Ss)$$
$$=P(M\cap \Pr\cap Ls)+P(M\cap \Pr\cap Ss)$$
$$=.05+.07=.12$$

c.

(S,M,L) and (Pl,Pr,St) the two groups on there own both are mutually independent and exhaustive

$$P(Ss)=\Sigma P(Ss\cap Size\cap Pattern)$$
$$=.04+.02+.05+.08+.07+.12+.03+.07+.08$$
$$=.56$$

P(Ls)=1-P(Ss)=.44 for Ls and Ss are independent and exhaustive

d.

P(M)=.08+07+.12+.10+.05+.07=.49

P(Pr)=.02+.07+.07+.02+.05+.02=.25

e.

$$P(M|Ss\cap Pl)=\frac{P(Ss\cap Pl\cap M)}{P(Ss\cap Pl)}$$

$$=\frac{.08}{.04+.08+.03}=\frac{8}{15}$$

f.

$$P(Ss|M\cap Pl)=\frac{P(Ss\cap M\cap Pl)}{P(M\cap Pl)}=\frac{.08}{.08+.10}=\frac{4}{9}$$

P(Ls|M∩Pl)=1-4/9=5/9

58.

$$
\begin{aligned}
&P(A\bigcup B\mid C)\\
&=\frac{P((A\bigcap C)\bigcup(B\bigcap C))}{P(C)}\\
&=\frac{P(A\bigcap C)+P(B\bigcap C)-P(A\bigcap B\bigcap C)}{P(C)}\\
&=P(A\mid C)+P(B\mid C)-P(A\bigcap B\mid C)
\end{aligned}
$$

Q.E.D.

63.

a.

b.

$$
\begin{aligned}
&\mathrm{P}(A\bigcap B\bigcap C)\\
&=P(C\mid A\bigcap B)P(A\bigcap B)\\
&=P(C\mid A\bigcap B)P(B\mid A)P(A)\\
&=.8\times.9\times.75=.54
\end{aligned}
$$

c.

$$
\begin{aligned}
&P(B\bigcap C)\\
&=P(B\bigcap C\mid A)P(A)+P(B\bigcap C\mid A')P(A')\\
&=P(A\bigcap B\bigcap C)+P(A'\bigcap B\bigcap C)\\
&=.8\times.9\times.75+.7\times.8\times.25=.68
\end{aligned}
$$

d.

$$
\begin{aligned}
&P(C)\\
&=P(C|A\bigcap B)P(A\bigcap B)+P(C|A'\bigcap B)P(A'\bigcap B)\\
&+P(C|A\bigcap B')P(A\bigcap B')+P(C|A'\bigcap B')P(A'\bigcap B')\\
&=.8\times.9\times.75+.7\times.8\times.25+.6\times.1\times.75+.3\times.2\times.25\\
&=.74
\end{aligned}
$$

e.

$$
\mathrm{P}(A\mid B\bigcap C)=\frac{P(A\bigcap B\bigcap C)}{P(B\bigcap C)}=\frac{.54}{.68}=\frac{27}{34}
$$

B+

71.

a.

$$
\begin{aligned}
&P(B'|A') \\
&= \frac{P(A' \cap B')}{P(A')} \\
&= \frac{P(A') + P(B') - P(A' \cup B')}{P(A')} \\
&= \frac{1 - P(A) + 1 - P(B) - (1 - P(A \cap B))}{1 - P(A)} \\
&= \frac{1 - P(A) + 1 - P(B) - (1 - P(A|B)P(B))}{1 - P(A)} \\
&= \frac{1 - P(A) + 1 - P(B) - (1 - P(A)P(B))}{1 - P(A)} \\
&= \frac{.6 + .3 - (1 - .4 \times .7)}{.6} = .3
\end{aligned}
$$

b.

$$
\begin{aligned}
&P(A \cup B) = P(A) + P(B) - P(A \cap B) \\
&= P(A) + P(B) - P(A|B)P(B) \\
&= P(A) + P(B) - P(A)P(B) \\
&= .4 + .7 - .4 \times .7 = 0.82
\end{aligned}
$$

c.

$$
\begin{aligned}
&P(A|A \cup B) = \frac{P(A \cap (A \cup B))}{P(A \cup B)} \\
&= \frac{P(A)}{P(A \cup B)} = \frac{.4}{.82} = \frac{20}{41}
\end{aligned}
$$

72.

$$
P(A_2 | A_3) = \frac{P(A_2 \cap A_3)}{P(A_2)} = \frac{.07}{.28} = .25 = P(A_2)
$$

which indicates A2 and A3 are independent.
Other pairs are dependant.

80.

denote 1,2,3,4 each of the components working well as A,B,C,D

$$
\begin{aligned}
&P(A \cup B \cup (C \cap D)) \\
&= P(A \cup B) + P(C \cap D) - P((A \cup B) \cap C \cap D) \\
&= P(A \cup B) + P(C \cap D) - P(A \cap C \cap D) - P(B \cap C \cap D) + (A \cap B \cap C \cap D) \\
&= .9 + .9 - .9^2 + .9^2 - .9^3 \times 2 + .9^4 = 0.9981
\end{aligned}
$$

84.

denote ith car passes as A_i

a. $P(\bigcap_{i=1}^{3} A_i) = \prod_{i=1}^{3} P(A) = .345$

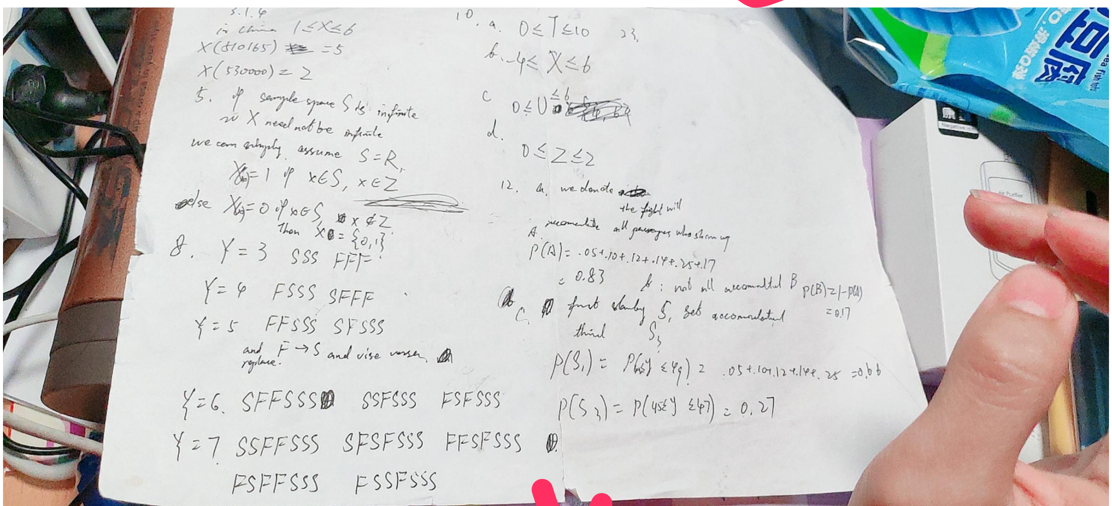
b. $P((\bigcap_{i=1}^{3} A_i)') = 1 - P(\bigcap_{i=1}^{3} A_i) = 1 - 0.345 = 0.655$

c. $$P((A_1' \cap A_2 \cap A_3) \cup (A_1 \cap A_2' \cap A_3) \cup (A_1 \cap A_2 \cap A_3'))$$
$$= .3 \times .7 \times .7 \times 3 = 0.441$$

d. $$P((A_1' \cap A_2' \cap A_3') \cup (A_1' \cap A_2' \cap A_3) \cup (A_1 \cap A_2' \cap A_3') \cup (A_1' \cap A_2 \cap A_3'))$$
$$= .3^3 + .3^2 \times .7 \times 3 = .216$$

denode this accident as D

e. $P(\bigcap_{i=1}^{3} A_i \mid D') = P(\bigcap_{i=1}^{3} A_i) / P(D') = 345/559$



3.1.4
in China $1 \le X \le 6$
$X(610165) = 5$
$X(530000) = 2$
5. if sample space S is infinite
so X need not be infinite
we can simply assume $S = R$,
$X(x) = 1$ if $x \in S$, $x \in Z$
else $X(x) = 0$ if $x \in S$, $x \notin Z$
Then $X = \{0, 1\}$.
8. $Y = 3$ SSS FFF
$Y = 4$ FSSS SFFF
$Y = 5$ FFSSS SFSSS
and replace $F \to S$ and vise versa.
$Y = 6$ SFFSSS SSFSSS FSFSSS
$Y = 7$ SSFFSSS SFSFSSS FFSFSSS
FSFFSSS FSSFSSS

10. a. $0 \le T \le 10$
b. $-4 \le X \le 6$
c. $0 \le U \le 6$
d. $0 \le Z \le 2$
12. a. we denote the fight will accomodate all passengers who show up A.
$P(A) = .05 + .10 + .12 + .14 + .25 + .17$
$= 0.83$
b: not all accomodated B $P(B) = 1 - P(A)$
$= 0.17$
c. first standby S_1 get accomodated
third S_3
$P(S_1) = P(y \le 49) = .05 + .10 + .12 + .14 + .25 = 0.66$
$P(S_3) = P(y \le 47) = 0.27$

23. a. $P(X=2) = 0.39 - 0.19 = 0.2$

b. $P(X>3) = 1 - P(X \leq 3) = 1 - 0.67 = 0.33$

c. $P(2 \leq X \leq 5) = 0.97 - 0.19 = 0.78$

d. $P(2 < X < 5) = 0.92 - 0.39 = 0.53$

25. $Y \geq 0$

$P(Y=0) = p$

$P(Y=1) = (1-p)p$

$$\begin{cases} P(Y=k) = (1-p)^k p, & k \in N \\ 0 & \text{otherwise.} \end{cases}$$

which is the pmf of Y.