AP Stats 6.7, 8, 9, 12, 15, 16

$\boxed{6.7}$ a) randInt(0, 1, 100) → L_1
b) add up list 1 to see how many hits
2nd: LIST MATH 5: sum(L_1) 55 (my answer)
c) Answers will vary made 6 missed 4

$\boxed{6.8}$ a) impossible P(event) = 0
b) certain P(event) = 1
c) unlikely P(event) = .01
d) more often than not P(event) = .6

$\boxed{6.9}$ a) S = {germinates, does not germinate}
b) If measured in weeks or months for example
S = {0, 1, 2, ...}
c) S = {A, B, C, D, F}
d) S = {makes 2, makes 1, makes none}
or S = {HH, HM, MH, MM} H = hit M = miss
e) S = {1, 2, 3, 4, 5, 6, 7}

$\boxed{6.12}$ a) 2 coins S = {HH, HT, TH, TT}
b) 3 coins S = {HHH, HHT, HTH, THH,
(8 outcomes) HTT, THT, TTH, TTT}
c) 4 coins S = HHHH HHHT HHTT HTTT TTTT
(16 outcomes)

HHHH	HHHT	HHTT	HTTT	TTTT
	HHTH	HTHT	THTT	
	HTHH	THHT	TTHT	
	THHH	THTH	TTTH	
		TTHH		
		HTTH		

$\boxed{6.15}$ a) $\underline{\#}\ \underline{\#}\ \underline{\#}\ \ \underline{\#}\ \underline{\#}\ \underline{\#}$

$10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 = 1\,000\,000$

b) $\underline{A}\ \underline{B}\ \underline{C}\ \ \underline{\#}\ \underline{\#}\ \underline{\#}$

$26 \cdot 26 \cdot 26 \cdot 10 \cdot 10 \cdot 10 = 17{,}576{,}000$

c) $26 \cdot 26 \cdot 26 \cdot 10 \cdot 10 \cdot 10 \cdot \underline{10} = 175{,}760{,}000$

$\boxed{6.16}$ a) ___ NEW ___ $\underline{10} \cdot \underline{10} \cdot \underline{10} \cdot \underline{10} = 10000$ for each new exchange

b) (NEW) $\underline{8} \cdot \underline{10} \cdot \underline{10}\ \ \underline{10} \cdot \underline{10} \cdot \underline{10} \cdot \underline{10} = 8000000$

can't be zero or one

s 6.24–29

4] P(win large battle) = .6

P(win small and win small and win small) = (.8)(.8)(.8)

= .512

He is more likely to win one large battle.

.25] P(defective) = .05   P(OK) = 1 − .05 = .95

P(OK, OK, OK ⋯ OK) = $(.95)^{12}$ = .54036 ≈ 54%

6.26] No. It is unlikely that the two events are independe[nt]. It is reasonable to assume that college graduates are less likely than others to be laborers or operators.

6.27] a) P(4 yrs. college) = $\frac{38225}{166438}$ = .230

b) P(55+) = $\frac{52022}{166438}$ = .313

c) P(55+ and 4 yrs. college) = $\frac{8005}{166438}$ = .048

A and B are not independent since P(A and B) ≠ P(A

.048 ≠ (.230)

6.28] Model 1: OK (total is 1)

2: OK (total is 1)

3: not OK (total is only 6/7)

4: not OK (prob. can't be negative)

6.29] a) OK since .55 + .45 = 1

b) not OK since .4 + .4 + .4 + .4 = 1.6 (> 1)

c) not OK P(Brn, Yel, Grn, Or, Tan) = .3 + .2 + .1

= .8 (not

4 6.18 − 23

$\boxed{18}$ a) $1-(.49+.27+.20) = 1-.96 = .04$
total probabilities $=1$ $P(AB) = .04$
b) $P(O \text{ or } B) = .49 + .20 = .69$

$\boxed{.19}$ a) $P(\text{Blue}) = 1-(.3+.2+.2+.1+.1) = 1-.9 = .1$
b) $P(\text{Blue}) = 1-(.2+.1+.2+.1+.1) = 1-.7 = .3$
c) $P(\text{Plain red, yellow, or orange}) = .2+.2+.1 = .5$
$P(\text{Peanut red, yellow, or orange}) = .1+.2+.1 = .4$

$\boxed{6.20}$ $P(\text{higher class}) = 1 - .46 = .54$

$\boxed{6.21}$ $P(\text{cardiovascular or Cancer}) = .45 + .22 = .67$
$P(\text{other cause}) = 1 - .67 = .33$

$\boxed{6.22}$ a) $P(\text{not forest}) = 1 - .35 = .65$
b) $P(\text{forest or pasture}) = .35 + .03 = .38$
c) $P(\text{neither forest nor pasture}) = 1 - .38 = .62$

$\boxed{6.23}$ a) $.41 + .23 + .29 + .06 + .01 = 1$ Since the table includes <u>all</u> possibilities it should total
b) $P(\text{not in top } 20\%) = 1 - .41 = .59$
c) $P(\text{top } 40\%) = P(\text{top } 20\% \text{ or second } 20\%) = .41 +$
$= .64$

$= .29$

$5 + .04 = .18$

) acres or more

$.9 = .71$

arm is less than 50 acres or is 500 acres or more

$= .29 + .18 = .47$

$.11 + .06 + .11 + .12 + .03 = .57$

$.20 + .08 + .01 + .04 + .01 = .43$

total 1.00

emale) = .43

not farming, forestry or fishing) = $1 - (.03 + .01)$

(D or E) = $.11 + .12 + .01 + .04 = .28$

P(not D or E) = $1 - .28 = .72$

a) P(any slot) = $1/38$

b) P(red) = $18/38 = .474$

c) P(col. win) = $12/38 = .316$

$\boxed{6.33}$ $P(G) = \frac{4}{6}$ $P(R) = \frac{2}{6}$

All have the same probabilities for the f

$P(4R \text{ and } 1G) = \left(\frac{2}{6}\right)^4 \cdot \frac{4}{6} = 2/243 \approx .0$

#1 $P(\text{win}) = \left(\frac{2}{6}\right)^4 \cdot \frac{4}{6} \cdot \left(\frac{4}{6}\right) = 4/729 \approx .$

#2 $P(\text{win}) = \left(\frac{2}{6}\right)^4 \cdot \frac{4}{6} \cdot \frac{2}{6} = 2/729 \approx$

#3 $P(\text{win}) = \left(\frac{2}{6}\right)^4 \cdot$

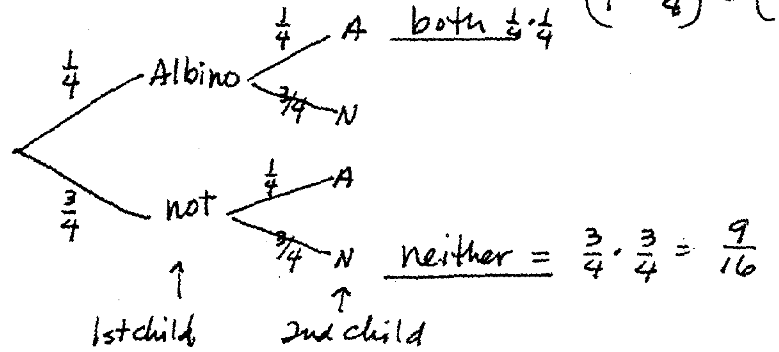
P (1st child Albino) $= \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$

P (Albino and Albino) $= \frac{1}{4} \cdot \frac{1}{4} = \frac{1}{16}$

P (neither is albino) $= P$(not Albino <u>and</u> not Albi

$(1 - \frac{1}{4}) \cdot (1 - \frac{1}{4}) = \frac{3}{4} \cdot \frac{3}{4}$

or



$\boxed{6.35}$ a) P (up) $= .65$ so P(Up and Up and Up) $= (.65)$

b) since performance in any year is supposedly inde

P(down) $= 1 - .65 = .35$

c) P(up and up OR down and down) $= .65^2 + .35^2 =$

$\boxed{6.36}$ a) P(under 65) $= .321 + .124 = .445$

P(65 or older) $= 1 - .445 = .555$

b) P(tests) $= .321 + .365 = .686$

P(No tests) $= 1 - .686 = .314$

c) P(65+ and tests) $= .365$ (from the table)

$P(65+) \cdot P(\text{tests}) = (.555)(.686) = .3807$

Since $P(A \text{ and } B) \neq P(A) \cdot P(B)$ A and B are <u>not</u> independent

The actual probability was <u>less</u> than if A and B were independent.

AP Stats 6.37–40

$\boxed{6.37}$ $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

$= .125 + .237 - .077 = .285$

$\boxed{6.38}$ $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

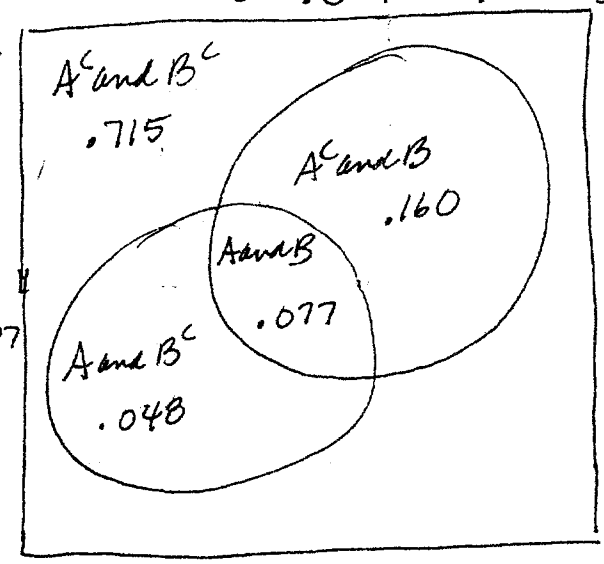
$= .6 + .4 - .2 = .8$

$\boxed{6.39}$

$P(A) = .125$

$P(B) = .237$

$P(A \text{ and } B) = .077$



a) A and B: household is both prosperous and educated

$P(A \text{ and } B) = .077$

b) A and B^c: household is prosperous but not educated

$P(A \text{ and } B^c) = (.125) + (.077)$

$= .048$

c) $P(A^c \text{ and } B) = (.237) - (.077)$

$= .160$

A^c and B: households are not prosperous but are educated

d) A^c and B^c: households are not prosperous and not educated

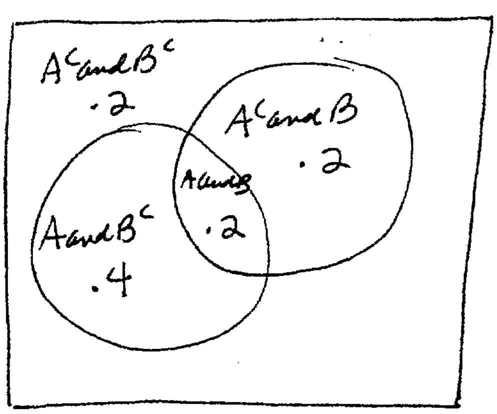
$P(A^c \text{ and } B^c) = 1 - (.048 + .077 + .160) = .715$

$\boxed{6.40}$

$P(A) = .6$

$P(B) = .4$

$P(A \text{ and } B) = .2$



a) $P(A \text{ and } B) = .2$ (given)

b) $P(A \text{ and } B^c) = .6 - .2 = .4$

c) $P(A^c \text{ and } B) = .4 - .2 = .2$

d) $P(A^c \text{ and } B^c) = 1 - (.4 + .2 + .2) = .2$

AP Stats 6.41 – 50

$\boxed{6.41}$ a) $P(65+) = \frac{18262}{99585} = .1834$

b) $P(\text{married} \mid 65+) = \frac{7767}{18262} = .4253$

c) $P(\text{married and } 65+) = \frac{7767}{99585} = .0780$

d) $P(65+ \text{ and married}) = P(65+) \cdot P(\text{married} \mid 65+)$

$7767/99585 = 18262/99585 \cdot 7767/18262$

$\boxed{6.42}$ a) $P(\text{widow}) = \frac{11080}{99585} = 0.1113$

b) $P(\text{widow} \mid 65+) = \frac{8636}{18262} = 0.4729$

c) $P(\text{widow} \mid \text{between } 25\text{-}64) = \frac{2425}{68709} = 0.0353$

d) $P(\text{widow}) \neq P(\text{widow} \mid 65+)$

$P(B) \neq P(B \mid A)$ $\quad \frac{11080}{99585} \neq \frac{8636}{18262}$

$\boxed{6.43}$ a) $P(18 \text{ to } 24 \mid \text{married}) = \frac{3046}{58929} = .0517$

b) 0.241 is the proportion of women who are <u>married</u> among those women who are age 18 to 24.

c) 0.517 is the proportion of women aged 18 to 24 among those who are married.

$\boxed{6.44}$ a) $P(\text{woman}) = 856/1626 = .5264$

b) $P(\text{woman} \mid \text{prof. degree}) = 30/74 = .4054$

c) $P(\text{woman}) \stackrel{?}{=} P(\text{woman} \mid \text{prof. degree})$

$856/1626 \neq 30/74$ not independent

$\boxed{6.45}$ a) $P(\text{man}) = 770/1626 = .4736$

b) $P(B \mid \text{male}) = 529/770 = .6870$

c) $P(\text{male and } B) = P(\text{male}) \cdot P(B \mid \text{male}) = (.4736)(.6870) = .3254$

or $529/1626 = .3253$

6.46 a) $P(\text{male}) = \dfrac{24457}{24457+6027} = \dfrac{24457}{30484} = .8023$

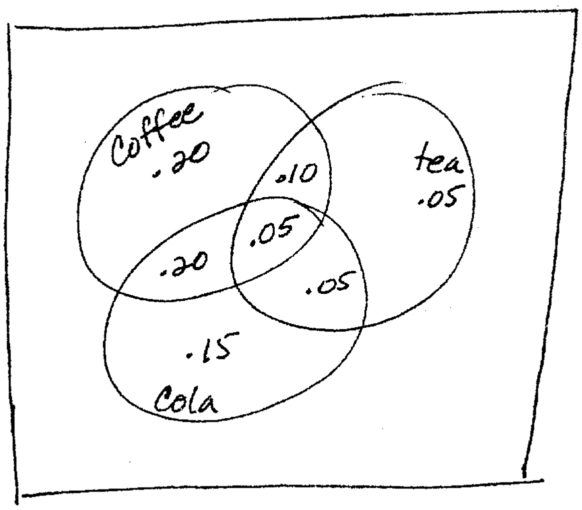
b) $P(\text{firearm}) = \dfrac{15802+2367}{30484} = .5960$

c) $P(\text{firearm}/\text{male}) = \dfrac{15802}{24457} = .6461$

$P(\text{firearm}/\text{female}) = \dfrac{2367}{6027} = .3927$

d) In choosing a suicide method, men are much more likely to choose a firearm.

6.47



a) only cola = .15
$(.45 - (.20+.05+.05))$

b) $1-(.20+.20+.05+.10+.05+.05+.15) = 1-.8 = \boxed{.\,}$

6.48 $P(A) = .46 \quad P(B|A) = .32$

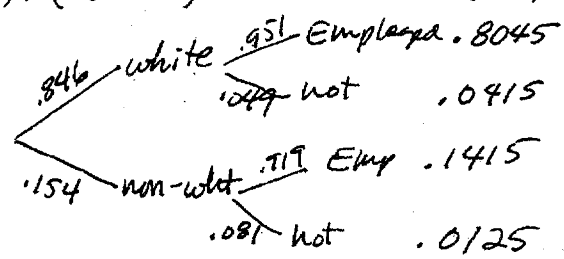
$P(A \text{ and } B) = P(A) \cdot P(B|A) = (.46)(.32) = .1472$

6.49 $P(\text{fall}) = .4 \quad P(\text{reneg.}|\text{fall}) = .8$

$P(\text{falls and reneg.}) = P(\text{fall}) \cdot P(\text{reneg}|\text{fall}) = (.4)(.8) = .32$

6.50 a) $P(\text{white}) = .846 \quad P(\text{emp.}/\text{white}) = .951 \quad P(\text{emp.}/\text{nonwht}) = .91$

b)



c) $P(\text{emp. and wht}) = .8045$

$P(\text{emp. and nonwht}) = .1415$

$P(\text{emp}) = .8045 + .1415 = .9460$

6.51

$.4 \times .8 = P(\text{Dollar falls and Renegotiate})$

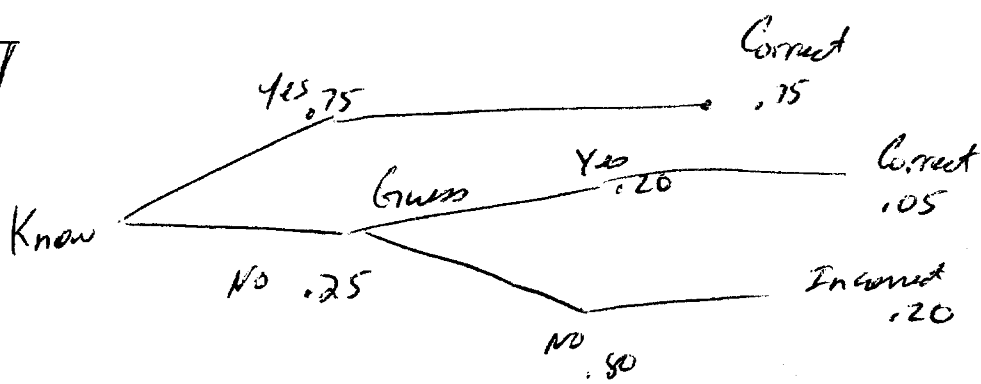
$.6 \times .2 = P(\text{Dollar does not fall and renegotiate})$

$.32 + .12 = \boxed{.44 \rightarrow P(\text{of a renegotiation})}$

6.52 $P(A|B)$ means B has happened, so what $P(A)$?

$$\frac{P(\text{employed and white})}{P(\text{employed})} = \frac{.8045}{.9460} = .8504$$

6.53



or

$.75 + \frac{1}{5}(.25) = .80$

$\boxed{6.54}$

white $.4 \times .3 = .12$

$.4 \times .9 = .36$

$.2 \times .5 = .10$

$.58$

The candidate expects to get 58% of vote.

$\boxed{6.55}$ $\frac{.75}{.8} = .9375$

~~6.56~~

6.59 (a) There are 10 pairs. Just using initials: {(A,D), (A,J), (A,S), (A,R), (D,J), (D,S), (D,R), (J,S), (J,R), (S,R)} (b) Each has probability 1/10 = 10%. (c) Julie is chosen in 4 of the 10 possible outcomes: 4/10 = 40%. (d) There are 3 pairs with neither Sam nor Roberto, so the probability is 3/10.

6.60 $(1 - 0.02)^{20} = (0.98)^{20} = 0.6676$.

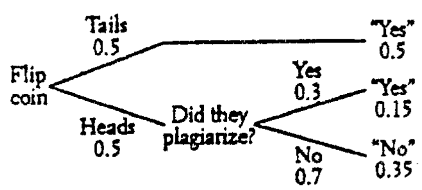
6.61 (a) $P(\text{B or O}) = 0.13 + 0.44 = 0.57$. (b) $P(\text{wife has type B and husband has type A}) = (0.13)(0.37) = 0.0481$. (c) $P(\text{one has type A and other has type B}) = (0.13)(0.37) + (0.37)(0.13) = 0.0962$. (d) $P(\text{at least one has type O}) = 1 - P(\text{neither has type O}) = 1 - (1 - 0.44)(1 - 0.44) = 0.6864$.

6.62 (a) $P(\text{female} \mid A) = \frac{0.09}{0.14 + 0.09} = \frac{9}{23} = 0.3913$.
(b) $P(\text{female} \mid D \text{ or } E) = \frac{0.01 + 0.04}{0.11 + 0.12 + 0.01 + 0.04} = \frac{5}{28} = 0.1786$.

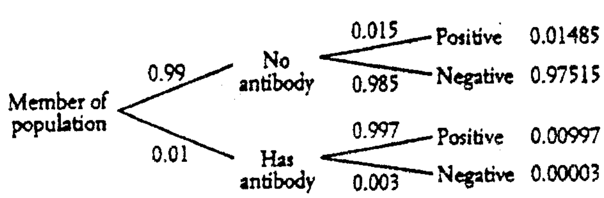
6.63 (a) $P(X \geq 50) = 0.14 + 0.05 = 0.19$. (b) $P(X \geq 100 \mid X \geq 50) = \frac{0.05}{0.19} = \frac{5}{19}$.

6.64 If $I = \{\text{infection}\}$ and $F = \{\text{failure}\}$, then $P(I \text{ or } F) = P(I) + P(F) - P(I \text{ and } F = 0.03 + 0.14 - 0.01 = 0.16$. The requested probability is $P(I^c \text{ and } F^c) = 1 - P(I \text{ or } F) = 0.84$.

6.65 The response will be "no" with probability 0.35 = (0.5)(0.7). If the probability of plagiarism were 0.2, then P(student answers "no") = 0.4 = (0.05)(0.8). If 39% of students surveyed answered "no," then we estimate that 2 × 39% = 78% have *not* plagiarized, so about 22% have plagiarized.



6.66 (a) On right. (b) $P(\text{positive}) = 0.01485 + 0.00997 = 0.02482$. (c) $P(\text{has antibody} \mid \text{positive}) = \frac{0.00997}{0.02482} = 0.4017$.



has a

85

.00997

— .00003

+ .01485

.015

Ds
odies

.985

— .97515

ive) = .00997 + .01485 = .02

AIDs | pos.) = $\frac{.00997}{.02482}$ = .4017

Provided that the test showed
or .5983) 59.83% of t
have AIDs. Almost 60%
~~false~~ positives.

If the true percent
many positives w