MA 222 A

EXAM #1 - SOLUTIONS

SPRING 2016

(1.) P(at least one wears glasses) = 1 − P(none wear glasses)
$= 1 - (.3)(.3)(.3) = .973$

(2.) P(takes more than 3 tosses) = P(1st three tosses do NOT have a "4")
$= (\frac{5}{6})(\frac{5}{6})(\frac{5}{6}) = .579$

(3.) P(at least 2 hits) = P(2 hits or 3 hits) = P(2 hits) + P(3 hits)
$= P(HH\bar{H} \text{ or } H\bar{H}H \text{ or } \bar{H}HH) + P(HHH)$
$= [(.9)(.9)(.1) + (.9)(.1)(.9) + (.1)(.9)(.9)] + [(.9)(.9)(.9)]$
$= .243 + .729 = .972$

(4.) P(2,6 or 6,2 or 3,5 or 5,3 or 4,4) = $\frac{5}{36}$ = .138

(5.) Let B_1 = fair coin selected B_2 = 2-headed coin selected

a) A = the chosen coin comes up Heads when flipped ONCE

$$P(B_1|A) = \frac{P(B_1)P(A|B_1)}{P(B_1)P(A|B_1) + P(B_2)P(A|B_2)}$$

$$= \frac{\frac{1}{2}\cdot\frac{1}{2}}{\frac{1}{2}\cdot\frac{1}{2} + \frac{1}{2}\cdot 1} = \frac{1}{3}$$

b) <u>now</u> <u>Let</u> <u>A</u> = the chosen coin comes up Heads twice ~~when~~ flipped twice

$$P(B_1|A) = \frac{P(B_1)P(A|B_1)}{P(B_1)P(A|B_1) + P(B_2)P(A|B_2)}$$

$$= \frac{\frac{1}{2}\cdot\frac{1}{4}}{\frac{1}{2}\cdot\frac{1}{4} + \frac{1}{2}\cdot 1} = \frac{1}{5}$$

(5.) $$\frac{\binom{7}{2}\binom{4}{2}\binom{1}{1}}{\binom{12}{5}} = \frac{\frac{7\cdot 6}{2\cdot 1}\cdot\frac{4\cdot 3}{2\cdot 1}\cdot 1}{\frac{12\cdot 11\cdot 10\cdot 9\cdot 8}{5\cdot 4\cdot 3\cdot 2\cdot 1}} = \frac{126}{792} = .159$$
$= \frac{7}{44}$

7) Let L = the homeowner files a LIABILITY claim
P = " " " " PROPERTY claim

GIVEN: $P(L) = .04$ $P(P) = .10$ $P(L\bar{P}) = .01$

FIND: $P(\bar{L}\bar{P})$

$$P(\bar{L}\bar{P}) = 1 - \{P(L) + P(P) - P(LP)\}$$
$$= 1 - \{.04 + .10 - P(LP)\} \quad EQ(1)$$

so we need $P(LP)$

now: $P(L)$ can be written as $P(LP \text{ or } L\bar{P})$

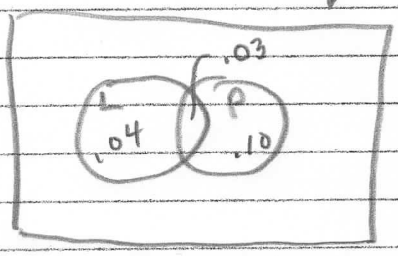
so: $P(L) = P(LP) + P(L\bar{P})$

$.04 = .01 + P(L\bar{P}) \Rightarrow P(L\bar{P}) = .03$

SO: from EQ(1) above

$$P(\bar{L}\bar{P}) = 1 - \{.04 + .10 - .03\}$$
$$= 1 - .11$$
$$= .89$$

many students also got the correct answer using a Venn Diagram



$$P(\bar{L}\bar{P}) = 1 - P(L \cup P)$$
$$= 1 - [P(L) + P(P) - P(L \cap P)]$$
$$= 1 - [.04 + .10 - .03] = .89$$