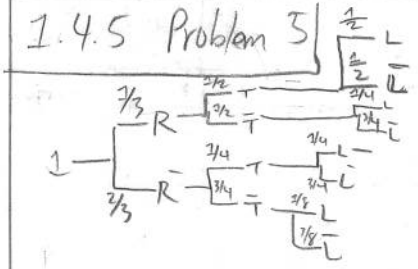
ECEn 370 | Homework #2 | Day 6 | Benjamin Bergeson

1.4.5 Problem 3



(a) $P(\bar{R}T\bar{L}) = \left(\frac{2}{3}\right)\left(\frac{1}{4}\right)\left(\frac{3}{4}\right) = \frac{1}{8}$

(b) $P(L) = \left(\frac{1}{2}\right)\left(\frac{1}{2}\right)\left(\frac{1}{3}\right) + \left(\frac{1}{4}\right)\left(\frac{1}{2}\right)\left(\frac{1}{3}\right) + \left(\frac{1}{4}\right)\left(\frac{1}{4}\right)\left(\frac{2}{3}\right) + \left(\frac{1}{8}\right)\left(\frac{3}{4}\right)\left(\frac{2}{3}\right) = \frac{11}{48}$

(c) $P(R \cap L) = \left(\frac{1}{2}\right)\left(\frac{1}{2}\right)\left(\frac{1}{3}\right) + \left(\frac{1}{4}\right)\left(\frac{1}{2}\right)\left(\frac{1}{3}\right) = \frac{1}{8}$

Schaum's 1.49

$P(P_1) = \frac{1}{3}$ $\quad P(D) = \frac{250}{3000} = \frac{1}{12}$

$P(P_1 \cap D) = \frac{1}{30}$ $\quad P(P_1|D) = \frac{\frac{1}{30}}{\frac{1}{12}} = \frac{2}{5}$

Schaum's 1.50

$S = \{BB, BG, GB, GG\}$ $A = \{BB, BG, GB\}$ $P(A) = \frac{3}{4}$ $B = \{BG, GG, GB\}$ $P(B) = \frac{3}{4}$ $P(B|A) = \frac{P(B \cap A)}{P(A)} = \frac{2/4}{3/4} = \frac{2}{3}$

Schaum's 1.51

(a) $\frac{20}{100} = 0.2 = P(A)$

(b) $\frac{19}{99} = P(B|A) \approx 0.192$

(c) $P(B \cap A) = P(B|A)P(A) = \frac{19}{495} \approx 0.0384$

Schaum's 1.59

$P(B|A) = 0.99$ $\quad P(B|\bar{A}) = 0.005$ $\quad P(A) = \frac{1}{2000}$ $\quad P(\bar{A}) = \frac{999}{1000}$

$$P(A|B) = \frac{P(B|A)P(A)}{P(B)} = \frac{P(B|A)P(A)}{P(B|A)P(A) + P(B|\bar{A})P(\bar{A})} = \frac{(0.99)(0.001)}{(0.99)(0.001) + (0.005)(0.999)} = 0.165414$$

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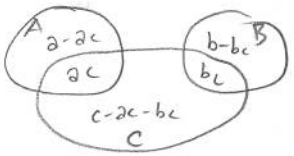
1.4.5 Problem 2

(a) $S = \{TTT, TTH, THT, THH, HTT, HTH, HHT, HHH\}$ $P(\{HHH\}) = 1/8 = P(A)$

(b) $P(\{TTH, THT, HTT\}) = \frac{3}{8} = P(B)$

(c) $C = \{THH, HTH, HHT, HHH\}$ $|D| = 7$ $P(C|D) = \frac{P(C \cap D)}{P(D)} = \frac{4/8}{7/8} = \frac{4}{7}$

1.4.5 Problem 3



$P(A \cup C) = a + c - ac = \frac{2}{3}$

$P(B \cup C) = b + c - bc = \frac{3}{4}$

$P(A \cup B \cup C) = a + b + c - ac - bc = \frac{11}{12}$

$P(A) = a = \frac{1}{3}$, $P(B) = b = \frac{1}{2}$, $P(C) = c = \frac{1}{2}$

Schaum's 1.68

Probability of functioning: $1 - P_i = P(A_i)$

$P(A) = P(\bigcap_{i=1}^{n} A_i) = \prod_{i=1}^{n} P(A_i) = \prod_{i=1}^{n} (1 - P_i)$

Schaum's 1.69

Probability of functioning: $1 - P_i = P(A_i)$

System functions if any one functions $P(\bar{A}) = \bigcap_{i=1}^{n} P_i = \prod_{i=1}^{n} P_i$

$P(A) = 1 - P(\bar{A}) = 1 - \prod_{i=1}^{n} P_i$

Schaum's 1.70

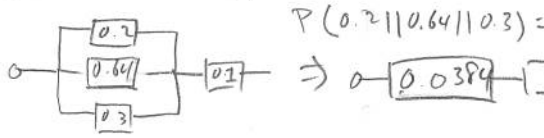
$P(S_3 \| S_4) = 1 - (1 - \frac{1}{2})(1 - \frac{1}{2}) = \frac{3}{4}$ $\quad P(S_2 [S_3 \| S_4]) = \frac{1}{2} \cdot \frac{3}{4} = \frac{3}{8}$

$P(ab) = 1 - (1 - \frac{1}{2})(1 - \frac{3}{8}) = 1 - (\frac{1}{2})(\frac{5}{8}) = 1 - \frac{5}{16} = \frac{11}{16}$

Schaum's 1.99

$P(0.4 - 0.4) = (1 - 0.4)(1 - 0.4) = (0.6)(0.6) = 0.36$ $\quad 1 - 0.36 = 0.64$

$P(0.2 \| 0.64 \| 0.3) = 1 - (0.2)(0.64)(0.3) = 0.9616$ $\quad 1 - 0.9616 = 0.0384$



$P(A) = (1 - 0.0384)(1 - 0.1) = 0.8654$