Probability part 3. HW.

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1.6: 1, 2, 3, 4, 6

1.7: 1a, 2a, 3a, 4, 5, 7, 8, 10a-d

1.6

1a) known: D = has disease, ND = no disease, SBT = successful blood test, FBT = false blood test

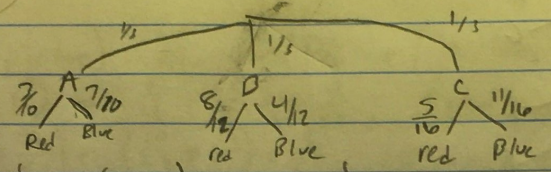
$P(ND) = .99$ $P(D) = .01$, $P(SBT|D) = .97$ $P(SBT|ND) = .06$

want: $P(SBT) = (P(SBT|D) \cdot P(D)) + (P(SBT|ND) \cdot P(ND)) = 0.0691$

b) $P(D|SBT) = \frac{P(SBT|D)(P(D))}{P(SBT)} = 0.1404$

c) $P(ND|FBT) = \frac{P(FBT|ND)(P(ND))}{P(FBT)} = \frac{(1-.06)(.99)}{1-.0691} = 0.9997$

2a)



$P(red) = \left(\frac{1}{3} \cdot \frac{7}{10}\right) + \left(\frac{1}{3} \cdot \frac{8}{12}\right) + \left(\frac{1}{3} \cdot \frac{5}{16}\right) = 0.426$

b) $P(Blue) = \left(\frac{1}{3} \cdot \frac{7}{10}\right) + \left(\frac{1}{3} \cdot \frac{4}{12}\right) + \left(\frac{1}{3} \cdot \frac{11}{16}\right) = 0.574$

c) $P(\text{red from Bag B}) = \frac{1}{3} \cdot \frac{8}{12} = \frac{2}{9}$

$P(A|red) = \frac{P(A \cap red)}{P(red)} = \frac{\left(\frac{1}{3} \cdot \frac{7}{10}\right)}{.426} = 0.235$

$P(B|blue) = \frac{P(B \cap blue)}{P(blue)} = \frac{\left(\frac{1}{3} \cdot \frac{4}{12}\right)}{.574} = 0.194$

3a) $P(I) = \frac{55}{100}$

b) $P(A) = \left(\frac{55}{100} \cdot \frac{10}{55}\right) + \left(\frac{45}{100} \cdot \frac{11}{45}\right) = \frac{21}{100}$

c) $P(A|I) = \frac{10}{55}$

d) $P(I|A) = \frac{P(A|I) \cdot P(I)}{P(A)} = \frac{10}{21}$

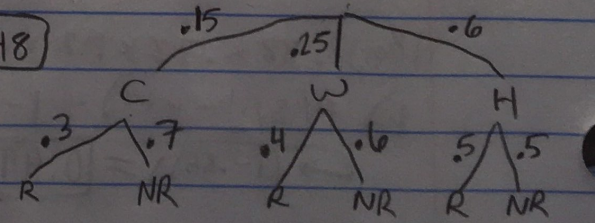
4) $P(1|T) = ?$ known: $P(1) = .45$, $P(2) = .38$, $P(3) = .17$

$P(1|T) = \frac{P(T|1)P(1)}{P(T)} = \frac{.10(.45)}{(.10 \cdot .45) + (.38 \cdot .15) + (.17 \cdot .5)}$ $P(T|1) = .10$, $P(T|2) = .15$, $P(T|3) = .5$

$= 0.2406$

$P(2|T) = \frac{P(T|2)P(2)}{P(T)} = \frac{.15 \cdot .38}{.187} = 0.3048$

$P(3|T) = \frac{P(T|3)P(3)}{P(T)} = 0.4545$



6) $P(C|NR) = \frac{P(NR|C)P(C)}{P(NR)} = \frac{.7 \cdot .15}{(.15 \cdot .7) + (.25 \cdot .6) + (.6 \cdot .5)} = 0.189$

1.7

1a) $7! = 5040$

2a) $P_2^7 = 42$

3a) $C_2^6 = 15$

4) $5 \cdot 3 \cdot 7 \cdot 6 \cdot 8 = 5040$

$8 \cdot 6 \cdot 7 \cdot (5+3) = 2688$

5) $3 \cdot 4 \cdot 2 = 24$

7) $P_5^{20} = 1,860,480$

$C_5^{20} = 15,504$

8a) $C_3^{100} = 161,700$

b) $C_3^{83} = 91,881$

c) $\frac{91881}{161700} = .5682 = P(\text{no Broken lightbulbs})$

d) $C_1^{17} \cdot C_2^{83} = 57851$

e) 0 bulbs $= 91,881$, 1 bulb $= 57851$ total $= 149732$

$P(\text{no more than 1 bulb}) = 0.926$

a-d

10a) $C_5^{52} = 2,598,960$

b) $C_5^{13} = 1287$

c) $C_5^{13} \times 4 = 5148$

d) $\frac{5148}{2598960} = P(\text{Plush}) = 0.00198$