M 362K Post-Class Homework 5

Xiaohui Chen
EID: xc2388

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2-57

The tree diagram is shown in Figure 1

(a)

$Pr(three\ faces) = \frac{10}{50} * \frac{11}{51} * \frac{12}{52} = \frac{11}{1105}$

(b)

$Pr(at\ least\ two\ faces) = Pr(three\ faces) + Pr(two\ faces) = \frac{11}{1105} + \frac{12}{52} * \frac{11}{51} * \frac{40}{50} + \frac{12}{52} * \frac{40}{51} * \frac{11}{50} + \frac{40}{52} * \frac{12}{51} * \frac{11}{50} = \frac{11}{85}$

(c)

$Pr(3rd - face|(1st - face \cap 2nd - face)) = \frac{10}{50} = \frac{1}{5}$

(d)

$Pr(three\ faces|at\ least\ two\ faces) = \frac{Pr(three\ faces)}{Pr(at\ least\ two\ faces)} = \frac{\frac{11}{1105}}{\frac{11}{85}} = \frac{1}{13}$

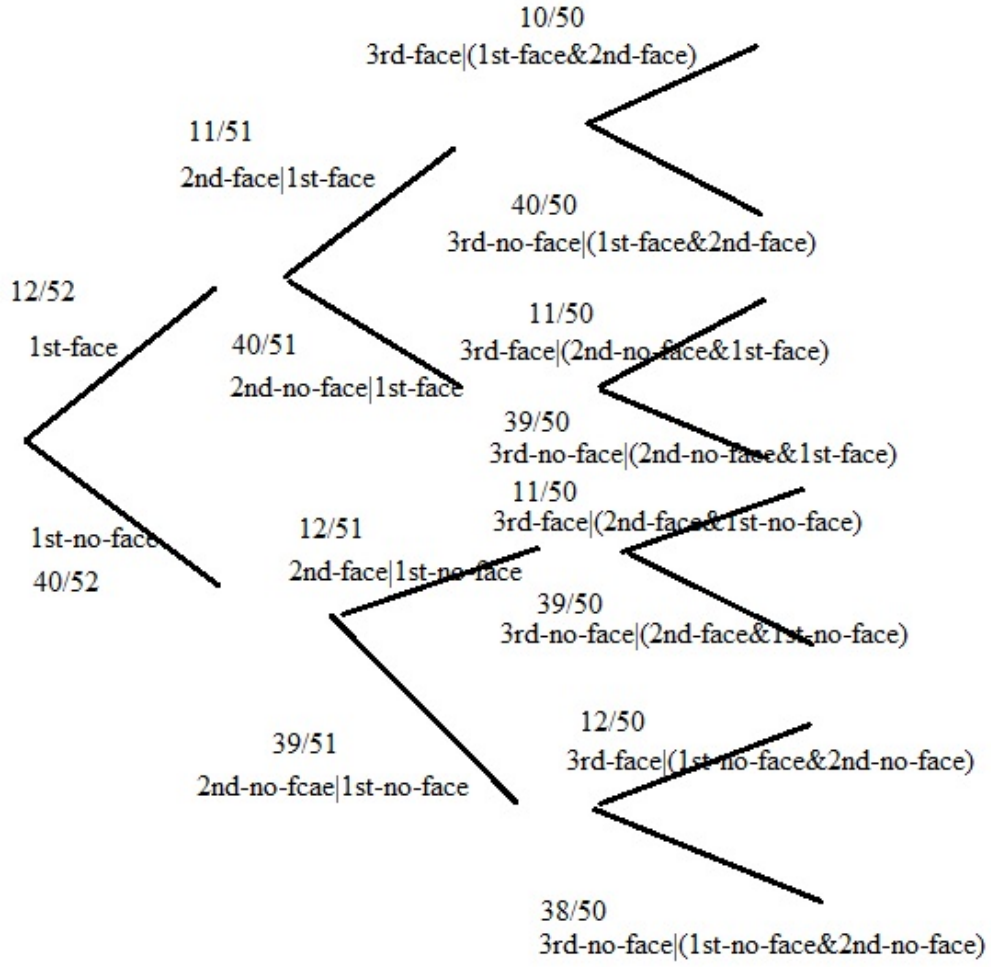

Figure 1: Tree diagram in 2-57

(e)

$Pr(at\ least\ two\ faces \cap Pr(last\ face)) = \frac{10}{50} * \frac{11}{51} * \frac{12}{52} + \frac{11}{50} * \frac{40}{51} * \frac{12}{52} + \frac{11}{50} * \frac{12}{51} * \frac{40}{52} = \frac{99}{1105}$

2-62

From the question, we know that $Pr(heavy) = 0.2$, $Pr(light) = 0.3$ and $Pr(non) = 0.5$

Let $Pr(die|non) = x$, then $Pr(die|light) = 2x$ and $Pr(die|heavy) = 4x$

$\therefore Pr(heavy|die) = \frac{Pr(die|heavy)*Pr(heavy)}{Pr(die|heavy)*Pr(heavy)+Pr(die|light)*Pr(light)+Pr(die|non)*Pr(non)} = \frac{4x*0.2}{4x*0.2+2x*0.3+x*0.5} \approx$ 0.42

Therefore the answer is (D)

2-63

$Pr(16-20|accident) =$

$\frac{Pr(accident|16-20)*Pr(16-20)}{Pr(accident|16-20)*Pr(16-20)+Pr(accident|21-30)*Pr(21-30)+Pr(accident|31-65)*Pr(31-65)+Pr(accident|66-99)*Pr(66-99)} =$

$\frac{0.06*0.08}{0.06*0.08+0.03*0.15+0.02*0.49+0.04*0.28} \approx 0.16$

Therefore the answer is (B)

Sample Exam 26

$Pr(seven\ claims) = Pr(1st-0) * Pr(2nd-7) + Pr(1st-1) * Pr(2nd-6) + Pr(1st-2) *$ $Pr(2nd-5) + Pr(1st-3) * Pr(2nd-4) + Pr(1st-4) * Pr(2nd-3) + Pr(1st-5) * Pr(2nd-$ $2) + Pr(1st-6) * Pr(2nd-1) + Pr(1st-7) * Pr(2nd-0) = \frac{1}{2} * \frac{1}{2^8} + \frac{1}{2^2} * \frac{1}{2^7} + \frac{1}{2^3} * \frac{1}{2^6} + \frac{1}{2^4} *$ $\frac{1}{2^5} + \frac{1}{2^5} * \frac{1}{2^4} + \frac{1}{2^6} * \frac{1}{2^3} + \frac{1}{2^7} * \frac{1}{2^2} + \frac{1}{2^8} * \frac{1}{2^1} = \frac{1}{64}$

Therefore the answer is (D)