Practice Exam 2

BUS 371 Exam 2 Solution Set Spring 2008

Part 1. Point values in [ ].

[5] 1) Let the 4 classes be A, B, C, and D, which are mutually exclusive.
\[ P(\text{A or D}) = P(\text{A}) + P(\text{D}) = 0.336 + 0.137 = 0.413 \]

ii) \[ P(\text{D|A or D}) = \frac{P(\text{D})}{P(\text{A or D})} = \frac{0.137}{0.413} = 0.328 \]

[5] 2) 2 trials, sampling w/o replacement \( \Rightarrow \) gen mult. law.

A = Peggy blue, B = Gracie pink; total # gumballs = 200
\[ P(A \cap B) = P(A) \times P(B|A) = \frac{5}{200} \times \frac{75}{199} = 0.085 \]

[10] 3) a) \[ P(F \cup A) = P(F) + P(A) - P(F \cap A) \]
\[ = 0.29 + 0.37 - 0.05 = 0.61 \]

b) \[ P(D \cap C^c) = P(D) - P(C \cap D) \]
\[ = 0.18 - 0.02 = 0.16 \]

[10] 4) Revised probability \( \Rightarrow \) Bayes' Rule

A_1 = Waco; \ P(A_1) = 0.3; \ P(B|A_1) = 0.09
where B = defective

and A_2 = Gates; \ P(A_2) = 0.7; \ P(B|A_2) = 0.13

\[ P(A_1|B) = \frac{P(A_1) \times P(B|A_1)}{P(A_1) \times P(B|A_1) + P(A_2) \times P(B|A_2)} \]
\[ = \frac{0.3 \times 0.09}{0.3 \times 0.09 + 0.7 \times 0.13} = 0.229 \]

[5] 5) order matters \( \Rightarrow P_n \) with \( N=16 \), \( n=3 \)
\[ P_n = \frac{16!}{(16-3)!} = \frac{16!}{13!} = 3,360 \]

[5] 6) order matters, \( \Rightarrow P^n \) with repetitions, \( N=36 \), \( n=7 \)
Practice Exam 2

1. \( P^n = N^n = 36^7 = 7,364,164,096 \)
   Subtract 1 for the blank plate.

2. Sequences: \( P^n - 1 = 78,364,164,095 \)
   Order doesn’t matter \( \Rightarrow C^n \)
   \( N = 35, n = 8 \)
   \( C^n = \frac{N!}{n!(N-n)!} = \frac{35!}{8!(35-8)!} = 23,535,820 \)

[A] \( B. \)

3. Binomial distn, with \( n = 24, p = 0.35, x = 9 \)
   \( E(x) = np = 24 \times 0.35 = 8.4; \sigma = \sqrt{np(1-p)} = \sqrt{8.4 \times 0.65} = 2.337 \)
   \( P(x) = C^n x \times (1-p)^{n-x} = C^{24} \times 0.35^9 \times 0.65^{15} = 0.161 \)

4. Hypergeometric distn (ticket ped), with \( N = 28, n = 5, x = 1 \)
   \( E(x) = n \times \frac{S(x)}{N} = \frac{5 \times 7}{28} = 1.25; \sigma = \sqrt{\frac{nS(x)(N-n)(N-S(x))}{N-1} \times \frac{28}{1} (1 - \frac{5}{28}) (\frac{28-5}{28-1})} = 0.948 \)

5. Poisson distn, with \( \mu = \frac{2.4}{1000} = \frac{24}{500} = \mu = 1.2; x = 1 \)
   \( P(x=1) = 1 - P(0) \rightarrow \) use complement
   \( = 1 - \mu^x e^{-\mu} \)

   \( = 1 - 1.2 e^{-1.2} = 0.699 \)

[A] \( B. \)

6. \( \frac{\mu}{\text{# new trials}} = \frac{\text{# old successes}}{\text{# old trials}} \)
   \( \frac{1.2}{500} = \frac{2.4}{1000} \)

Part 2 @

1. \( 1 - F \) (change first statement to "with" - - - )
2. \( F \) (classical probability requires this)
3. \( F \) (limit this)
   \( \lim_{n \to a} e = (1 + \frac{1^m}{m}) \)

End of Exam 2