ACTEX EXAM P STUDY MANUAL – April 2020 Edition

Errata List, by S. Broverman Updated Oct 19/20

Aug 10/20 Page iii, table of contents, "Independent Events: should be page 65 (not 66)

Sep 3/20 Page 305, definition of policy limit, add $Min(X,u)$ and $X \wedge u$

Sep 3/20 Page 306, line 3 spacing should be fixed

Jun 24/20 Page 387, Solution to #27. The first and second lines should say
"Suppose that X_1 is the amount of Jim's loss and X_2 is the amount of Bob's loss. They are independent and both equal to X, where the distribution of X has pdf …".
Also in the pdf on line 2, X_2 should be X.

Oct 17/20 Page 451, #18 solution, in the formulation of X, the interval $2 < T < 3$ should be $2 < T < 4$ and the interval $T > 3$ should be $T > 4$

Oct 17/20 Page 452, #20 solution, in line 8 there is an extra "+" sign

Oct 17/20 Page 453, #24 solution, line 2 should have $0 – 0 = 0$ (not $1 – 1 = 0$)

Oct 17/20 Page 468, #14 solution, 7 line from bottom of page missing "+"

May 22/20 Page 494, #18, in answers B,C,D and E, y should be λ

Oct 19/20 Page 501, Solution to #17, in line 3 the last probability should be P[TD' | D'] = 1.0

May 22/20 Page 501, #18 solution, e^{-y} should be $e^{-\lambda}$ in every occurrence

Oct 19/20 Page 512, #3 solution, in line 6, the final $X_2 > y$ should be $X_1 > y$

May 22/20 Page 512, #4 solution, final line should be
Then $P(S < 4) = 1 \times 0.8 + 1 \times 0.15 + 0.88 \times 0.05 = 0.994$. Answer: D

Oct 19/20 Page 513, #5 solutions, line 12 near end of line,
Should be E(X) = E(3K+3) = 3 x E(K)+3

Oct 19/20 Page 515, #12 solution, first line should have E(W) = E(X) + E(Y)

May 22/20 Page 518, #24 solution is incorrect. The correct solution is the following.

24. Let X_A be the number of sales for manufacturer A, and X_B for B, and X_{CD} for manufacturers C and D combined. X_A, X_B and X_{CD} have a multinominal distribution with

$n = 10$ and $p_A = 0.10$, $p_B = 0.15$, $p_{CD} = 0.75$

We wish to find the probability $P[(X_A \geq 2) \cap (X_B \geq 2)] = 1 - P[(X_A \leq 1) \cup (X_B \leq 1)]$.

$P[(X_A \leq 1) \cup (X_B \leq 1)] = P(X_A \leq 1) + P(X_B \leq 1) - P[(X_A \leq 1) \cap (X_B \leq 1)]$.

$P(X_A \leq 1) = P(X_A = 0) + P(X_A = 1) = (.9)^{10} + 10(.9)^9(.1) = 0.7361$.

$P(X_B \leq 1) = P(X_B = 0) + P(X_B = 1) = (.85)^{10} + 10(.85)^9(.15) = 0.5443$.

The sales numbers that result in the event $(X_A \leq 1) \cap (X_B \leq 1)$ are as follows:

	Sales			
X_A	0	1	0	1
X_B	0	0	1	1
X_{CD}	10	9	9	8

According to the multinomial probability function,

$$P[(X_A = x_A) \cap (X_B = x_B) \cap (X_{CD} = x_{CD})] = \frac{10!}{x_A! \times x_B! \times x_{CD}!} \times p_A^{x_A} \times p_B^{x_B} \times p_{CD}^{x_{CD}}$$

The probabilities of the combinations above are

$$P[(X_A = 0) \cap (X_B = 0) \cap (X_{CD} = 10)]$$
$$= \frac{10!}{0! \times 0 \times 10!} \times (0.1)^0 \times (0.15)^0 \times (0.75)^{10} = 0.0563.$$

In a similar way, we get $P[(X_A = 1) \cap (X_B = 0) \cap (X_{CD} = 9)] = 0.0751$,

$P[(X_A = 0) \cap (X_B = 1) \cap (X_{CD} = 9)] = 0.1126$, and

$P[(X_A = 1) \cap (X_B = 1) \cap (X_{CD} = 8)] = 0.1352$.

Then, $P[(X_A \leq 1) \cap (X_B \leq 1)] = 0.0563 + 0.0751 + 0.1126 + 0.1352 = 0.3792$,

and $P[(X_A \leq 1) \cup (X_B \leq 1)] = 0.7361 + 0.5443 - 0.3792 = .9012$,

and the probability that no manufacturer gets dropped is $1 - 0.9012 = 0.0988$. Answer: A

May 22/20 Page 520, #29 solution is incorrect.
The value of -450 on the 6th line from the bottom should be -225. This changes the bottom line of the solution to be
The total expected insurance payment is 12,500 x .09 – 225 + 738.99 = 1,639 Answer : E

Jul 28/20 Page 523, #13. The question should have
"A policyholder is selected at random and found to have high blood pressure. Calculate the probability that the policyholder is over age 65."

Jul 28/20 Page 525, #24. Answer should be A) 1/32 B) 1/16 C) 1/8 D) 3/16 E) 5/16

Jul 26/20 Page 526, #25 answers should be A) 5/22 B) 5/23 C) 5/24 D) 1/5 E) 5/26

Oct 19/20 Page 529, #6, I. should have $h''(x) = 2$

And II. should have $h''(x) = -\dfrac{1}{2x^{3/2}}$

Jul 28/20 Page 533, #24 solution. The result of the integral in the second last line before the graph should be $4t^3 - 3t + 1$.

The following should be added right after the graph:

$$E[T] = \int_0^{1/2} P(T > t)\, dt = \int_0^{1/2} (4t^3 - 3t + 1)\, dt = \frac{3}{16} \ .$$

Jul 26/20 Page 534, #25 solution is incorrect.

In the third paragraph of the solution, second line the conditional probability should say that there are 12 ways that the total could be 8 from Die 3 for a probability of $\frac{12}{36} = \frac{1}{3}$.

Then it should say $P[(\text{total of } 8) \cap (\text{Die } 3)] = \frac{1}{3} \times \frac{1}{3} = \frac{1}{9}$ and then

$$P[\text{total of } 8] = \frac{5}{108} + \frac{2}{27} + \frac{1}{9} = \frac{25}{108} \ ,$$

And $P(\text{Die } 1 \mid \text{total of } 8) = \frac{P[(\text{Die } 1) \cap (\text{total } 8)]}{P[\text{total of } 8]} = \frac{5/108}{25/108} = \frac{1}{5}$ Answer: D