STAT 110 A, Probability & Statistics for Engineers I
UCLA Statistics, Spring 2003

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HOMEWORK 3

Due Date: Friday, May 09, 2003, turn in after lecture

Correct solutions to any four problems carry full credit, but you must complete problem HW3_5. See the HW submission rules. On the front page include the following header.

- (**HW_3_1**) [Sec. 3.1, #4] Let X = the number of nonzero digits in a randomly selected zip code. What are the possible values of X? Give three possible outcomes and their associated X values.

- (**HW_3_2**) [Sec. 3.2, #12] Let X = the number of tires on a randomly selected automobile that are underinflated.
  (a) Which of the following three p(x) functions is a legitimate probability mass function for X, and what are the other two not allowed?

x	0	1	2	3	4
$p_1(x)$	0.3	0.2	0.1	0.05	0.05
$p_2(x)$	0.4	0.1	0.1	0.1	0.3
$p_3(x)$	0.4	0.1	0.2	0.1	0.3

  (b) For the legitimate pmf of part (a), compute $P(2 \le X \le 4)$, $P(X \le 2)$, and $P(X \ne 0)$.
  (c) If p(x) = c (5 − x) for x = 0, 1, 2, 3, 4, what is the correct value of c?

- (**HW_3_3**) [Sec. 3.2, #13] A mail-order computer business has six telephone lines. Let X denote the number of lines in use at a specified time. Suppose the pmf of X is as given in the accompanying table. Calculate the probability of each of the following probabilities:

x	0	1	2	3	4	5	6
p(x)	0.10	0.15	0.20	0.25	0.20	0.06	0.04

(a) {at most 3 lines are in use}
(b) {fewer than 3 lines are in use}
(c) {at least 3 lines are in use}
(d) {between 2 and 5 lines, inclusive, are in use}
(e) {between 2 and 4 lines, inclusive, are not in use}
(f) {at least 4 lines are not in use}

- **(HW_3_4)** [Sec. 3.3, #28] The pmf for X = the number of major defects on a randomly selected applicance of a certain type is given in the table below. Compute the following:

x	0	1	2	3	4
p(x)	0.08	0.15	0.45	0.27	0.05

(a) E(X), the expected value of the R.V. X.
(b) V(X), the variance of X.
(c) SD(X), the standard deviation of X.
(d) V(X), using the shortcut formula, $V(X) = E(X^2) - \mu^2$. Should equal the answer in part (b).

- **(HW_3_5)** [Sec. 3.3, #31] An appliance dealer sells three different models of upright freezers having 13.5 ft^3, 15.9 ft^3, and 19.1 ft^3 (cubic feet) of storage space, respectively. Let X = the amount of storage space purchased by the next customer to buy a freezer. Suppose that X has pmf.

x	13.5	15.9	19.1
p(x)	0.2	0.5	0.3

(a) Compute E(X), E(X^2), E(X^3), and V(X).

(b) If the price of a freezer having capacity X ft^3 is 25X − 8.5, what is the expected price paid by the next customer to buy a freezer?

(c) What is the variance of the price 25X − 8.5 paid by the next customer? Interpret this value!

(d) Suppose that although the rated capacity of a freezer is X, the <u>actual</u> capacity is h(X) = $X - 0.01X^2$, slightly under the advertised space. What is the expected <u>actual</u> capacity of the freezer purchased by the next customer?

Last modified on Saturday, April 26, 2003 14:21:42 by dinov@stat.ucla.edu.

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