AxM: Curso SOA P
Tarea 6

Ejercicio 1

A random variable X has density function

$$f(x)=\begin{cases}\frac{5}{72}\left[3(x-2)^2-(x-2)^4+4\right], & \text{for } 0<x<3\\ 0, & \text{otherwise.}\end{cases}$$

Calculate the mode of the distribution.

(A) 0.000
(B) 0.775
(C) 2.000
(D) 3.000
(E) The correct answer is not given by (A), (B), (C), or (D).

Ejercicio 2

A statistician determines that the probability density function $f(x)$ of the losses from construction accidents is proportional to $\frac{x}{\left(1+x^2\right)^9}$, for all nonnegative x.

Calculate the 2nd percentile of the losses from construction accidents.

(A) 0.003
(B) 0.020
(C) 0.045
(D) 0.050
(E) 0.222

Ejercicio 3

Let N denote the number of items returned out of the next 500 items sold at a department store. For each item sold, the probability that the item is returned is 0.12. Returns are mutually independent.

Calculate the standard deviation of N.

(A) 7.27
(B) 7.75
(C) 12.75
(D) 20.98
(E) 52.80

Ejercicio 4

A company tests five batteries. Each battery has a probability p of being defective, where p is a constant. The events of different batteries being defective are mutually independent.

The number of defective batteries out of the five batteries is a random variable, N, where $\mathrm{E}\left(N^2\right)=1.80$.

Calculate $\mathrm{Var}(N)$.

(A) 0.80
(B) 0.98
(C) 1.15
(D) 1.67
(E) 1.80

Ejercicio 5

The annual numbers of thefts a homeowners insurance policyholder experiences are analyzed over three years.

Define the following events:

i) A = the event that the policyholder experiences no thefts in the three years.
ii) B = the event that the policyholder experiences at least one theft in the second year.
iii) C = the event that the policyholder experiences exactly one theft in the first year.
iv) D = the event that the policyholder experiences no thefts in the third year.
v) E = the event that the policyholder experiences no thefts in the second year, and at least one theft in the third year.

Determine which three events satisfy the condition that the probability of their union equals the sum of their probabilities.

(A) Events A, B, and E
(B) Events A, C, and E
(C) Events A, D, and E
(D) Events B, C, and D
(E) Events B, C, and E

Ejercicio 6

The lifetime of a light bulb has density function, f, where $f(x)$ is proportional to

$\frac{x^2}{1+x^3}$, $0 < x < 5$, and 0, otherwise.

Calculate the mode of this distribution.

(A) 0.00
(B) 0.79
(C) 1.26
(D) 4.42
(E) 5.00

Ejercicio 7

A box contains 5 balls numbered 1, 2, 3, 4 and 5. Three balls are drawn at random and without replacement from the box.

If X is the median of the numbers on the three chosen balls, then calculate the probability function for X, where nonzero.

(A) $g(x) = 0.2$ for $x = 1, 2, 3, 4, 5$.

(B) $g(x) = 1/3$ for $x = 2, 3, 4$.

(C) $g(x) = 13/125$ for $x = 1, 5$; $31/125$ for $x = 2, 4$ and $37/125$ for $x = 3$.

(D) $g(x) = 0.3$ for $x = 2, 4$; 0.4 for $x = 3$

(E) $g(x) = 0.1$ for $x = 2, 7/3, 11/3, 4$; 0.2 for $x = 8/3, 3, 10/3$.

Respuestas

1. B
2. D
3. A
4. A
5. A
6. C
7. D

Práctica adicional

Ejercicios de la guía gratuita de la SOA para el examen Probability :

27, 30, 37, 39, 144, 187, 190, 213, 224, 260, 261, 262, 268, 321, 379, 383, 384, 394, 395, 397, 406, 429, 472, 483, 494, 500, 551, 592, 608, 611, 612