Zur LVA in TISS

Dashboard / Meine Kurse / 107.254-2022W / Tests / Test 3 - Random variables and distributions

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|---|---|
| **Begonnen am** | Samstag, 25. Februar 2023, 19:49 |
| **Status** | Beendet |
| **Beendet am** | Samstag, 25. Februar 2023, 20:05 |
| **Verbrauchte Zeit** | 15 Minuten 17 Sekunden |
| **Bewertung** | **8** von 10 (**80**%) |
| **Feedback** | Congratulations! You have successfully passed the test! |

Frage **1**
Vollständig
Erreichte Punkte 1 von 1

Let $X$ be a random variable with probability density function of the form

$$f(x) = \begin{cases} -2x, & -1 \le x \le 0 \\ 0, & \text{else} \end{cases}.$$

Compute $P(-\frac{3}{4} < X < -\frac{1}{2})$.

- a. 7/8
- b. 19/64
- c. 1/2
- d. 5/16

Frage **2**
Vollständig
Erreichte Punkte 1 von 1

Let

$$F(x) = \begin{cases} 0 & x < 0 \\ 2x & 0 \le x < 0.5 \\ 1 & x \ge 0.5 \end{cases}$$

be the cumulative distribution function of a random variable $X$ and let $Y = 2X + 1$. Then, the expectation $E(Y)$ equals:

- a. 0.5
- b. 0.75
- c. 0.25
- d. 1.5

Frage **3**
Vollständig
Erreichte Punkte 0 von 1

Let $X$ be a random variable with the cumulative distribution function $F_X$. Let $X_1$ and $X_2$ be independent and identically distributed copies from $X$. Let $Y = \min\{X_1, X_2\}$. Then, the probability $P(Y \le 1)$ can be expressed in terms of $F_X$ as:

- a. $(1 - F_X(1))^2$
- b. none of the rest
- c. $(F_X(1))^2$
- d. $2F_X(1) + (F_X(1))^2$

Frage **4**
Vollständig
Erreichte Punkte 1 von 1

Which of the following statements is true for random variables?

- a. A random variable assumes numerical values associated with the random outcomes of an experiment; more than one value can be assigned to each sample point.
- b. A random variable assumes numerical values determined by a random number generator.
- c. A random variable assumes numerical values associated with the random outcomes of an experiment; only one value can be assigned to each sample point.
- d. A random variable can only assume discrete values.

Frage **5**
Vollständig
Erreichte Punkte 1 von 1

Let $X$ be a random variable that takes values -1, 1, and 2 with probabilities 0.3, 0.1 and 0.6 respectively. Let $Y = 3X^2$. Then,

a. The variance of $X$ is less than 2 and the variance of Y is less than 10.
b. The variance of $X$ is larger than 2 and the variance of $Y$ is less than 10.
c. The variance of $X$ is less than 2 and the variance of $Y$ is larger than 10.
d. The variance of $X$ is larger than 2 and the variance of $Y$ is larger than 10.

Frage **6**
Vollständig
Erreichte Punkte 1 von 1

Let X and Y be two continuous random variables whose second moments are finite. Then,

a. $\mathbb{V}ar(2X - Y) = 2\mathbb{V}ar(X) + \mathbb{V}ar(Y)$
b. $\mathbb{E}(X^2 + Y^2) = \mathbb{E}(X^2) + \mathbb{E}(Y^2)$
c. $\mathbb{E}(XY) = \mathbb{E}(X) \cdot \mathbb{E}(Y)$
d. $\mathbb{V}ar(X + Y) = \mathbb{V}ar(X) + \mathbb{V}ar(Y)$

Frage **7**
Vollständig
Erreichte Punkte 0 von 1

Let us consider ballgames which cannot end in a tie. Suppose a bookie will give you $\$6$ for every $\$1$ you risk if you pick the winners in three ballgames. Thus, for every $\$1$ you bet you will either lose $\$1$ or gain $\$5$. What is the bookie's expected earnings per dollar wagered?

a. $-\$2/8$
b. $\$2/8$
c. $\$34/8$
d. $\$21/27$

Frage **8**
Vollständig
Erreichte Punkte 1 von 1

Let the cumulative distribution function of a random variable $X$ be given by

$$F(x) = \begin{cases} 0 & x < 0 \\ \frac{x^2}{16} & 0 \le x < 4 \\ 1 & x \ge 4 \end{cases}.$$

The $0.4$-quantil of $F$ is approximately equal ...

a. 0.01
b. 2.53
c. 0.8
d. 1.79

Frage **9**
Vollständig
Erreichte Punkte 1 von 1

Let $X$ be a random variable $X$ with the probability distribution given in the table

| $X$ | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| $P(X)$ | $2k$ | $3k$ | $13k$ | $2k$ |

where $k$ is a positive constant. The probability $P(X < 1.5)$ is equal to

a. $0.15$
b. $0.25$
c. $0.65$
d. $0.90$

Frage **10**
Vollständig
Erreichte Punkte 1 von 1

Can the function

$$p(x) = \begin{cases} ax^2 + 2x - 1 & x = 1, 2, 3 \\ 0 & \text{else} \end{cases}$$

be the probability mass function for some discrete random variable? Here $a$ is a real number.

a. Yes, only for a unique positive $a$.
b. No, because probabilities cannot be negative.
c. No, because probabilities cannot be greater than 1.
d. Yes, only for a unique negative $a$.

◀ Test 2 - Conditional probabilities and the Bayes theorem

Direkt zu:

Test 4.1 - Common families of distributions 1 ▶