PaŠ pre informatikov (cv 08)

Beáta Stehlíková, FMFI UK Bratislava

Príklady z prednášky

Príklad 1. Nech X je náhodná premenná s rovnomerným rozdelením na intervale (-1,1) a Y je jej druhá mocnina. Potom X, Y nie sú nezávislé. Ukážeme však, že majú nulovú kovarianciu.

Príklad 5.

Let X and Y be the number of hours that a randomly selected person watches movies and sporting events, respectively, during a three-month period. The following information is known about X and Y:

$$E(X) = 50, \quad E(Y) = 20, \quad \mathrm{Var}(X) = 50, \quad \mathrm{Var}(Y) = 30, \quad \mathrm{Cov}(X,Y) = 10.$$

One hundred people are randomly selected and observed for these three months. Let T be the total number of hours that these one hundred people watch movies or sporting events during this three-month period. Approximate the value of $P(T < 7100)$.

(A) 0.62 (B) 0.84 (C) 0.87 (D) 0.92 (E) 0.97

Príklad: Diskrétny náhodný vektor I.

9.6 ⊡ Let X and Y be two independent $Ber(\frac{1}{2})$ random variables. Define random variables U and V by:

$$U = X + Y \quad \text{and} \quad V = |X - Y|.$$

a. Determine the joint and marginal probability distributions of U and V.

b. Find out whether U and V are dependent or independent.

c. Vypočítajte kovariančnú a korelačnú maticu náhodného vektora (U, V).

Príklad: Diskrétny náhodný vektor II.

10.5 ⊡ Suppose X and Y are discrete random variables taking values 0,1, and 2. The following is given about the joint and marginal distributions:

	a			
b	0	1	2	$P(Y = b)$
0	8/72	...	10/72	1/3
1	12/72	9/72	...	1/2
2	...	3/72	...	...
$P(X = a)$	1/3	...	...	1

a. Complete the table.

b. Compute the expectation of X and of Y and the covariance between X and Y.

c. Are X and Y independent?

Príklad: Kovariancia a korelácia po lineárnej transformácii

10.11 Recall the relation between degrees Celsius and degrees Fahrenheit

$$\text{degrees Fahrenheit} = \frac{9}{5} \cdot \text{degrees Celsius} + 32.$$

Let X and Y be the average daily temperatures in degrees Celsius in Amsterdam and Antwerp. Suppose that $\mathrm{Cov}(X, Y) = 3$ and $\rho(X, Y) = 0.8$. Let T and S be the same temperatures in degrees Fahrenheit. Compute $\mathrm{Cov}(T, S)$ and $\rho(T, S)$.