

Tests: Exam: Total: GRADE:

NAME: NEPTUN:

Exam 2017 01 09 , 90 minutes

1. In a box there are 5 red and 3 blue balls. You pick balls, one after the other without replacement. You stop picking when two red has already been drawn. Let X mean the number of draws.
 - (a) Set up a table for the distribution of X .
 - (b) If you made 1000 experiments, approximately how much would be the average of the number of draws?

2. The life-time of an object has a uniform distribution between 0 and B . Approximately only 25 % of such objects live more than 6 years.
 - (a) How much is the expected value of these objects?
 - (b) What is the probability that such an object lives more than 6 years on condition that it lives more than 5 years?

3. The height of a randomly chosen man follows the normal distribution with an expected value of 180 cms and a standard deviation of 10 cms. The height of a randomly chosen woman follows the normal distribution with an expected value of 170 cms and a standard deviation of 5 cms. In a large group of people 25% are men, 75% are women. You choose persons one after the other until a the person is higher than 190 cms, and then you stop choosing.
 - (a) What is the probability that you make exactly 4 choices?
 - (b) What is the probability that the person is a woman on condition that you make exactly 4 choices?

4. X is a random variable with values between $-\infty$ and 0. The density function of X is $f(x) = 3e^{3x}$ on the interval $-\infty; 0$.
 - (a) What is the probability that $-2.5 < X < -0.5$?
 - (b) Determine the expected value of X .

5. (X, Y) follows the distribution which has the density function

$$f(x, y) = \frac{2x}{y} \quad (0 < x < 1, x < y < \frac{1}{x})$$
 - (a) Find the density function of X .
 - (b) Find the conditional expected value of Y on condition that $X = x$.

6. Give the meaning of the variance of
 - (a) the data set $\{1; 3; 7; 8; 11\}$ by making simple calculations (without using calculator). (*Show the details of your calculations.*)
 - (b) a continuous random variable by a correct(!) mathematical formula.

Standard normal distribution function

x	$\Phi(x)$	x	$\Phi(x)$	x	$\Phi(x)$	x	$\Phi(x)$	x	$\Phi(x)$	x	$\Phi(x)$
0,0	0,50	0,5	0,69	1,0	0,84	1,5	0,93	2,0	0,98	2,5	0,99
0,1	0,54	0,6	0,73	1,1	0,86	1,6	0,95	2,1	0,98	2,6	1,00
0,2	0,58	0,7	0,76	1,2	0,88	1,7	0,96	2,2	0,99		
0,3	0,62	0,8	0,79	1,3	0,90	1,8	0,96	2,3	0,99		
0,4	0,66	0,9	0,82	1,4	0,92	1,9	0,97	2,4	0,99		