

Tests: Exam: Total: GRADE:

NAME: NEPTUN:

Exam 2016 12 19 , 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 a red is 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. Assume that on a certain island, on the average, there are 2.5 small and 0.5 serious earthquakes during a year. The number of small and the number of serious earthquakes are independent. **(a)** What is the probability that during a year there will not be earthquakes at all? **(b)** What is the probability that during three successive years, there will be altogether more than 1 serious earthquakes?

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 35 % are men, 65 % are women. **(a)** Choosing 2 people at random what is the probability that both have a height between 175 and 180 cms? **(b)** What is the probability that both are women on condition that both have a height between 175 and 180 cms?

4. X is a random variable with values between 0 and 3. The distribution function of X is $F(x) = \frac{x^3}{27}$ on the interval $[0; 3]$. **(a)** What is the probability that $0.5 < X < 2.5$? **(b)** Determine the expected value of X .

5. Assume that the weight of a sack of potato sold in a supermarket has a normal distribution with expectation 10 kg and standard deviation 0.3 kg. **(a)** Determine the probability that a sack has a weight less than 9.9 kg. **(b)** Determine the probability that out of 5 such sacks more than 2 have a weight less than 9.9 kg.

6. The density function of (X, Y) is $f(x, y) = 3y$ ($0 < x < y < 1$) **(a)** Find the density function of X . **(b)** Find the conditional density function of X on condition that $Y = y$.

Standard normal distribution function
(with 2 decimals)

x	$\Phi(x)$	x	$\Phi(x)$	x	$\Phi(x)$
0.0	0.50	1.0	0.84	2.0	0.98
0.1	0.54	1.1	0.86	2.1	0.98
0.2	0.58	1.2	0.88	2.2	0.99
0.3	0.62	1.3	0.90	2.3	0.99
0.4	0.66	1.4	0.92	2.4	0.99
0.5	0.69	1.5	0.93	2.5	0.99
0.6	0.73	1.6	0.95	2.6	1.00
0.7	0.76	1.7	0.96		
0.8	0.79	1.8	0.96		
0.9	0.82	1.9	0.97		