ANSWERS

List 2.

Ex 3.
r1=rbinom(20,10,0.3)
r2=rbinom(20,10,0.3)

a) mean(r1)=2.95; var(r1)=2.05; sd(r1)=1.43; min(r1)=0; max(r1)=5; Q_1=2; Q_2=3; Q_3=4 (the values may differ due to the randomness of the sample)
b) On average we get 2.95
On average, values deviate from the mean by 1.43
Minimal value in this sample is 0
Maximal value in this sample is 5
At least 25% of values are not greater than 2 and at least 75% of values are not less than 2
At least 50% of values are not greater than 3 and at least 50% of values are not less than 3
At least 75% of values are not greater than 4 and at least 25% of values are not less than 4
c) For example
0.1: quantile(r1,0.1)=1
At least 10% of values are not greater than 1 and at least 90% of values are not less than 1

Ex 5.
x=c(6, 7, 10, 5, 10, 12, 11, 7, 7, 9, 10, 8, 16, 11)
hist(x,col="blue",breaks=c(5,8,10,14,16)
Point series: table(x)
Interval series: table(cut(x,sqrt(length(x))))

List 3.

Ex 1. a) C=0.2 c) E(X)=0.6, D^2(X)=2.84, on average, random variable X is equal to 0 (0 is the closest value from 0.6, that X can be equal), d) E(Y)=3.8, D^2(Y)=25.56

Ex 2. P(X=-2)=9/13; P(X=5)=3/13; P(X=10)=1/13; E(X)=0.54; D^2(X)=15.94; P(X≥0)=4/13

Ex 3. P(X=5)=5.43e-09 ; P(X≤ 2)=0.9999; P(X≥5)=5.4612e-09

Ex 4. P(X=2)=0.124; P(X≥4)=0.0027; P(X≤2)=0.9743

Ex 5. P(X=2)=0.1217; P(X≥4)=0.00575; P(X≤2)=0.9659

Ex 6. P(X≥2)=0.15; E(X)=1.18~1

Ex 7. P(X>2)=0.3233; P(X≤3)=0.8571

Ex 8. $\lambda = \frac{1}{E(X)} = \frac{1}{2.4}$; P(X>3)=0.2865; P(2<X<3)=0.1481

Ex 9. P(1.85<X<2.25)=0.5671

Ex 10. $\bar{X} \sim N(200,2)$, P(199<$\bar{X}$<202)=0.5328; $S \sim N(5000,50)$, P(S≤5100)=0.9772

List 4.

Ex 1. P(X>157)=0.9842

Ex 2. P(X$\leq$ 15)=0.6321

Ex 3. $S \sim N\left(150, \sqrt{12}\right)$, P(S≤147)=0.1932

Ex 4. P(X<4)=1; P(X>5)=0

Ex 10. $\bar{X} \sim N(202, 14/8)$, P(198<$\bar{X}$<206)=0.9777

List 5.

Ex 1.

a) Population – ALL diamonds produced by new synthetic method; sample – SIX diamonds produced by new synthetic method; test variable – the weight of diamonds produced by new synthetic method
b) $\bar{x} = 0.53$ carats, $s = 0.0559$ carats
c) With 95% confidence, we can say that the confidence interval (0.47; 0.59) [carats] covers the unknown mean of diamond weight produced by new synthetic method
d) With 95% confidence, we can say that the confidence interval (0.0012; 0.0188) [carats^2] covers the unknown variance of diamond weight produced by new synthetic method

Ex 2.

With 98% confidence, we can say that the confidence interval (100.9; 103.1) [hl] covers the unknown mean of daily water consumption

Ex 3.

a) $\bar{x} = 3.44$ kg; $s^2 = 0.6297$ kg^2
b) With 90% confidence, we can say that the confidence interval (3.12; 3.77) [kg] covers the unknown mean of protein content of a 50kg serving of seaweed
c) With 90% confidence, we can say that the confidence interval (0.388; 1.234) [kg^2] covers the unknown variance of protein content of a 50kg serving of seaweed

Ex 4.

With 95% confidence, we can say that the confidence interval (1217.41; 1218.59) [h] covers the unknown mean of the bulb lighting time

Ex 5.

With 90% confidence, we can say that the confidence interval (592.2; 607.8) [h] covers the unknown mean of hardness of steel.

Ex 6.

With 95% confidence, we can say that the confidence interval (15.53; 24.47) [s] covers the unknown mean of time needed to clamp detail on the machine tool

Ex 7.

With 90% confidence, we can say that the confidence interval (2.4; 18.5) [m^2] covers the unknown variance of lake's depth

Ex 8.

With 95% confidence, we can say that the confidence interval (12.08; 16.39) [g] covers the unknown mean of detail weight

Ex 9.

With 95% confidence, we can say that the confidence interval (5.8; 8.77) [m] covers the unknown mean of distance travelled by the robot

Ex 10.

With 95% confidence, we can say that the confidence interval (0.618; 0.702) [-] covers the unknown percentage of people satisfied with membership in EU