Preliminary Final Exam,
Exam Date and Time: May, 5, 10:00, room –435

1. Examination on the subject "How to blow your nose" rent physicists, lyricists and botanists. The number of lyricists 3 times more than the number of physicists and the number of botanists equals to the number physicists. The probability of getting A for physicist is 90%, 94% for the lyricist and for botanist is 95%. One student was randomly selected from the general list. What is the probability to obtain A for this student? If a student randomly selected from the general list has A, then what is the probability that he is a lyricist?

0.934; 0.6039

2. Seed germination of the plant varieties is estimated with a probability of 0.8. What is the probability that of 100 sown seeds germinate at least 74? **0.948**

3. The plant sent to the base 300 high quality products. The probability of damage of each item in transit is equal to 0.01. What is the probability that on arrival at the base of the number of damaged products will be a) more than 2; b) less than 2? **0.5768; 0.2**

4. Assume that the nicotine content of cigarettes is a normal random variable with average value 1 mg and standard deviation of 0.02 mg. Find the probability that only 3 out of 5 randomly selected cigarettes nicotine is less than 0.99 mg. **0.1405**

5. In the workshop some of the company car automatic is pouring juice in cans. The volume of juice in the bank is a normal random variable with a standard deviation of 0.05 liters. Determine the average volume of juice in the cans, if there is a requirement that only 5% (no more than) of cans may be less than 0.95 liters.

1.03

6. The industry includes 500 firms. We know that the firm has an average of 77.5 workers with a standard deviation of 21 people. If you compiled a random sample of 49 firms, then what is $P(\bar{x} < 79)$? **0.7**

7. Tea-packing machine automatically packs tea in packs. From the large party of packs 36 packages were randomly selected. Their weighing gave the following figures: 16 weight is 150 g, 10 weight is 149.5 g, 6 is 151 g, 3 is 149 g and 1 weights is 152 g. Find the 99% confidence interval to determine the mean weight of pack throughout the party, believing that the weight of packs is normally distributed.

(149.7; 150.3) ($\bar{x} = 150$)

8. The public service company wants to utilities based on a sample to estimate the average apartment rent for a certain type of apartment with reliability 90% and a maximum error of 10 soms. Assuming that the rent has a normal distribution with a standard deviation of 35 soms, find the minimum sample size.

34

9. Manufacturer's representative argues that the average battery life is 585 hours. For testing were selected 42 batteries. The average lifetime was 620 hours with standard deviation $s = 120$ h.

A) Find the 95% confidence interval. **(583.7; 656.3)**

B) Whether there is reason to believe that the term is overvalued at $\alpha = 0.01, 0.02, \ldots, 0.10$?

FTR H0 if $\alpha < 3\%$

10. Check the approval of the insurance company that the average size of claims for insurance is \$1500, if the sample of 16 claims gave the following results: $\bar{x} = \$1450$ $\sum(\bar{x} - x)^2 = 60984$ at $\alpha = 0.05$. The size of claims is normally distributed. **R H_0**

11. 95% confidence intervals to estimate the general mean of the normally distributed random variable is the interval $(8.75; 9.45)$. What the sample size was used, if $\sigma = 1.3$. **53**

12. Sultan has 10 mothers-in-law, 2 of them are blondes and 8 are brunettes. Every night, with equal probability he dreams of one mother-in-law. He wakes up with a cry of horror at 8% when dreaming mother-in-law is blonde and 3% when the mother-in-law is brunette. Determine the probability that Sultan wakes with a cry of horror

a) at the following night; b) 2 nights out of 10; c) more than 3 nights out of 50;
d) from 12 to 16 nights per year.

0.04; 0.052; 1-0.857; 0.49

13. Two different companies are developing their own IQ tests. A psychologist by the instrumentality of them tests 8 randomly selected students.

Student	1	2	3	4	5	6	7	8
Test 1	98	94	111	102	108	105	92	88
Test 2	105	95	113	98	112	109	97	95

1) Construct 95% confidence interval to estimate average difference of results.
2) Using p-values check the statement that the results of the 2nd test results exceed the 1st more than 2 units.

10% < p-value < 25% , FTR H_0