Mathematical statistics

Exercise set 5

1. In a certain call centre a call should last 20 minutes. A random sample of 16 employees has shown an average call time of 24 minutes. The standard deviation of a call is known to be 4 minutes.

Assuming that the distribution of a call duration is normal test the hypothesis that the mean call duration is not equal to 20 minutes at 10% significance level.

2. An expert claims that man weight of a dog of certain breed is 12 kg. 100 dogs of that breed were chosen at random, with their mean weight calculated as 12.8 kg and standard deviation calculated as 5 kg. At 5% significance level test the expert's claim.

3. In a certain department an employee spends on average 1.3 hours doing admin work. A random sample of 12 employees has shown an average time of 1.5 hour and standard deviation of 0.2 hour.

Assuming that the distribution of time spent doing admin work is normal test the hypothesis that mean time of admin work is not 1.3 at 1% significance level.

4. Cat food producer claims that 9 out of 10 cats prefer his brand over any other brand. Observation of 50 cats has shown that 42 cats preferred the given brand. Test at 1% significance level the producer's claim.

5. Geography book states that mean sea depth in a certain region is 850 m. 70 measurements were taken, and mean depth was calculated as 830 m, with standard deviation equal to 90 m. For $\alpha = 5\%$ verify book's statement.

6. In a sample of 200 students 158 of them had an average grade of 4 and above. For $\alpha=1\%$ verify hypothesis that proportion of students with average grade of 4 and above is greater than 0.7.

7. Random sample of 15 students showed a variance of number of daily smoked cigarettes as 58. Verify if the variance is greater than 50, significance level 5%.