Lab 10

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10 Confidence Intervals, Hypothesis Testing and p-Values

10.1 The Weight of Chicken

The weight of chicken is normally distributed with standard deviation 0.6 kg. A farmer claims that his chicken weigh on average at least 3.8 kg.

1. Suppose that we sample 16 chicken and get an average weight of 3.55 kg. Is this evidence enough to refute the farmer's claim at a significance level of $\alpha = 5\%$ or $\alpha = 1\%$? What is the p-value?

2. What would be the answer if we didn't know the population standard deviation, and the sample standard deviation were 0.6 kg?

10.2 Nuts in Chocolate

A sample of 25 chocolates is tested for their content of nuts. On average, the samples had 12g of nuts, and the sample standard deviation was 2g. Find a value c such that we can assert *with 99% confidence* that c is smaller than the mean nut content.

10.3 Testing Car Tyres

The manufacturer of a new car tyre claims that its average life will be at least 60,000 km. To verify this claim a sample of 25 tyres is tested. The outcome of the test is a sample mean of 54,000 km and a sample standard deviation of 12,000 km.

1. Find a value c such that, with probability 99%, the true mean is less than c.

2. Compute the p-value for the hypothesis $H_0 : \mu \geq 60,000$. Approximate it as well as you can from the probability tables provided.

3. What would you need to change in your calculations if we knew that the *population* standard deviation is 12,000 km? What would be the values for c in 1.) and the p-value in 2.)?

10.4 Weights of Salmon

The weights of salmon grown at a commercial hatchery are normally distributed with a standard deviation of 1.2 pounds. The hatchery claims that the mean weight of this year's crop is at least 7.6 pounds. Suppose a random sample of 16 fish yielded an average weight of 7.2 pounds. Is this strong enough evidence to reject the hatchery's claims at the

1. 5 percent level of significance;
2. 1 percent level of significance?
3. What is the p-value?