

Biometry, H19, Test 3

Name:

Student number

1. (2.5 marks) A sample of 55 mature Douglas fir trees has average diameter at breast height of 185.8cm with sample standard deviation of 16.2cm. Construct a 98% confidence interval for the diameter at breast height of mature Douglas fir trees. Based on this sample can you claim that the average diameter of mature Douglas fir trees exceeds 180cm?

2. (3 marks) Toxaphene is an insecticide that has been identified as a pollutant in the Great Lakes. An article in *J. of Envi. Sci. Health* (1998) studied the effects of toxaphene on animals and reported weight gains (in g) for rats given a low dose (4mg) and for control rats who were not exposed to toxaphene. For 18 control rats the weight gain was $7g$ with standard deviation of $4g$, while for 14 low-dose rats the weight gain was $34g$ with standard deviation of $12g$. Construct a 95% confidence interval for the difference of weight gains between the exposed rats and the control rats. Based on these samples do rats exposed to toxaphene gain more weight compared to the control rats?

3. (3 marks) An article in *Austr. J. of Agric. Res.* (1993) determined that the Lysine level (essential amino acid) in a sample of eight soybean meals is as follows (g/kg):

22.2 24.7 20.9 26.0 27.0 24.8 26.6 23.8

Construct a 98% confidence interval for the population average Lysine level.

4. (3 marks) An article in *Med. and Sci. in Sports and Exercise*. (2005) studied cycling performance before and after eight weeks of strength training. 70 previously untrained males had on average 313 watts of peak power at the end of training with sample standard deviation of 37 watts. Is there evidence that the peak power at the end of training will exceed 300 watts in a population of males undergoing 8 weeks of training? Test $H_0 : \mu = 300$ versus $H_1 : \mu > 300$ at $\alpha = 0.05$. Report a p -value and draw a conclusion in the context of the problem.

5. (2.5 marks) A police report claims that speeding a serious problem near Mirabel Airport on HW50. Rejean and Katie are on highway patrol duty and have to estimate the proportion of speeding motorists at this spot. During their shift R&K find that 576 out of 886 drivers are over the speed limit. Construct a 99% confidence interval for the percentage of motorists who exceed the speed limit on HW50 near the airport. Based on this confidence interval can R&K claim that more than 60% of drivers exceed the speed limit near the airport?

6. (3 marks) A 1981 study by Engelmann and Obst claims that the average venom yield of an adult king cobra is 420 mg (dry weight). Travelling in to Cambodia you decide to test this claim. A sample of 7 adult king cobras you managed to capture (with permission of the authorities) without getting bitten gave the following venom yields (mg):

385 340 360 365 415 375 400

Test $H_0 : \mu = 420$ versus $H_1 : \mu < 420$ at the 5% level of significance. Report a p -value and draw a conclusion in the context of the problem.

7. (3 marks) To protect a rare plant species Oka national park has made six areas in the park off-limits to the public. The counts below are for the number of rare plants in these six areas before the protection began and 2 years after the areas were declared off-limits:

Before		12	15	28	33	16	29
After		19	20	25	36	18	39

Test $H_0 : D = 0$ versus $H_1 : D > 0$ at the 5% level of significance. Here, D is the difference of counts after protection minus before protection. Make sure to report a p -value and to draw a conclusion in the context of the problem.