

Biometry, H22, Test 2

Name: _____

Student number _____

1. (3 marks) The sand cat (*Felis margarita*) is a small wild cat that inhabits sandy and stony deserts far from water sources. On average it moves 5.4km at night in search of small rodents and birds. The standard deviation of these travels is 0.9km and the population is normally distributed.
 - Compute the probability that a sand cat will move more than 4km but less than 8km on a given night.
 - Compute the bottom 5% and the top 10% of nightly moving distances of sand cats.

2. (3.5 marks) The fishing cat (*Prionailurus viverrinus*) is a medium-sized wild cat of South and Southeast Asia. The fishing cat lives foremost in the vicinity of wetlands, along rivers, streams, oxbow lakes, in swamps, and mangroves. A sample of 48 newly born fishing kittens had a mean weight of 172g with standard deviation of 24g. Construct a 95% and a 99% confidence intervals for the population average weight of newly born fishing kittens. Write a sentence commenting on the tension between confidence and precision when using confidence interval estimates.

3. (3 marks) The jaguarundi (*Herpailurus yagouaroundi*) is a wild cat native to the Americas. Secretive and alert, the jaguarundi is typically solitary. Individuals live in large home ranges, and are sparsely distributed within a region. A study in Brazil of the home ranges of six jaguarundi gave the following values in km^2 :

13.2 10.6 8.0 18.4 17.2 11.0

Assuming that the home range areas is normally distributed compute a 99% confidence interval for the population home range area.

4. (3.5 marks) The ocelot (*Leopardus pardalis*) is a medium-sized spotted wild cat distributed from the Southern US to Brazil. It prefers areas close to water sources with dense vegetation cover and high prey availability. Two subspecies are recognized. A sample of 50 ocelots from the northern subpopulation has average weight of $10.4kg$ with standard deviation of $3kg$. A sample of 64 ocelots from the southern subpopulation has average weight of $13.1kg$ with standard deviation of $3.2kg$. Determine a 95% confidence interval for the difference of average weights in the two subpopulations assuming equal variances. Based on this confidence interval can you make a claim that the average weights differ?

5. (3 marks) Ginger tabbies (*Gingiberi cattus*) are predominantly male. A sample of 210 orange house cats had 173 males and 37 females. Construct a 98% confidence interval for the population percentage of male orange tabbies. Based on this confidence interval can you claim that more than 80% of all ginger house cats are male?

6. (3 marks) The margay (*Leopardus wiedii*) is a small wild cat native to Central and South America. A solitary and nocturnal cat it lives mainly in primary evergreen and deciduous forest. An old study found the average length of margay to be 65cm . A sample of 52 margay cats has an average length of 68.5cm with standard deviation of 9cm . Test $H_0 : \mu = 65$ versus $H_1 : \mu > 65$. Report a p -value and draw a conclusion in the context of the problem.

7. (3.5 marks) The kodkod (*Leopardus guigna*) is the smallest felid species native to the Americas. It lives primarily in central and southern Chile. Melanistic kodkods with spotted black coats are quite common. The melanistic phenotype is caused by the deletion of a single cysteine residue at position 126 of Agouti-signaling protein. The relative concentration of black eumelanin in a sample of five black kodkods was found to be

0.42 0.60 0.48 0.40 0.32

Assuming that the population relative concentration of black eumelanin is normally distributed test $H_0 : \mu = 0.5$ versus $H_1 : \mu < 0.5$. Report a range for the p -value and draw a conclusion in the context of the problem.

8. (3.5 marks) Neutering is linked to an increased risk of weight gain if no change is made to what and how much you feed your pet after the surgery. A sample of the weights of 7 dogs before and after neutering showed the following weights (*kg*):

Before		27.4	18.1	27.2	9.7	44.5	12.2	8.8
After		30.0	19.3	26.8	10.1	47.6	16.8	8.9

Use this data to test $H_0 : d = 0$ against $H_1 : d > 0$. Report a p-value for the test. Here, $d = \mu_2 - \mu_1$. Draw a conclusion in the context of the problem.

9. (3 marks) The black-footed cat (*Felis nigripes*), also called the small-spotted cat, is the smallest wild cat in Africa. Females measure on average 34.9cm in head and body length and the standard deviation is thought to be 2.0cm . A sample of six female black-footed cats produced the following head and body lengths

33.2 30.6 38.0 36.4 37.2 31.0

Assuming that the population length are normally distributed test $H_0 : \sigma = 2.0$ versus $H_1 : \sigma > 2.0$. Report a range for the p -value and draw a conclusion in the context of the problem.

10. (3.5 marks) The Asian golden cat (*Catopuma temminckii*) is a medium-sized wild cat native to the northeastern Indian subcontinent, Southeast Asia and China. A sample of 32 Asian golden cats from Nepal has average weight of 11.3kg with standard deviation of 2.5kg . Another sample of 26 Asian golden cats from Sumatra has average weight of 13.2kg with standard deviation of 4.8kg . Without presuming that the standard deviation of the two populations are equal test $H_0 : \mu_1 = \mu_2$ versus $H_1 : \mu_1 < \mu_2$. Report a p -value and draw a conclusion in the context of the problem.