

Practise Exam (Section 1)

BIOB11 2025

Instructions

The exam has two sections. Each section can award a maximum of 15 point (30 points total). The pass mark (godkänt) is 60%, the high pass mark (väl godkänt) is 80%. You do not need to pass both sections to pass the exam.

This is Section 1.

In this section, you are *not* permitted to access any materials. Under no circumstances are you allowed to communicate with anyone during the exam. Write your answers in either Swedish or English. For multiple choice questions, your chosen answer must be clearly indicated.

Note that in the real exam, there will also be a four point question from Kaj's lecture and subsequent discussion. Hence this practise exam has only 11 points.

Good luck!

Question 1 (1 point)

A group of researchers at Lund University want to estimate the GC content (the proportion of DNA bases that are guanine G or cytosine C rather than adenine A or thymine T) in immune function related genes in the genome of fältsorken (*Microtus arvalis*). They select 250 known immune function related genes spread across the genome and calculate the GC content. Using the meaning of the following words in statistics, what is the population and what is the sample in this scenario?

Question 2 (1 point)

When testing a hypothesis, researchers often calculate and report a p-value. What information does the p-value provide?

Question 3 (1 point)

Allometry is the study of how the characteristics of organisms change with size. You have measured the carapace width (mm) and claw width (mm) of 60 krabbtaskor (*Cancer pagurus*) caught off the coast of Norway. What statistic could you use to describe the relationship between body mass and claw width?

Choose one:

- A) The slope of the line fit with linear regression
- B) F-statistic
- C) Median
- D) Chi-squared

Question 4 (1 point)

You have measured the mass (grams) of blåmesar (*Cyanistes caeruleus*) chicks from nest boxes in four different environments: high density urban (Malmö), low density urban (Dalby), forested (Skrylle) and agricultural (outskirts of Genarp). What would be an appropriate test statistic to use to investigate differences in nestling mass between these environments?

Choose one:

- A) The standard deviation
- B) F-statistic
- C) Chi-squared
- D) The inter-quartile range

Question 5 (1 point)

In the same study as described in question 4, you also recorded if each chick successfully fledges (leaves) the nest. What would be an appropriate test statistic to use to test if there is a difference in the proportion of chicks that successfully fledge between the environments?

Choose one:

- A) The standard deviation
- B) F-statistic
- C) The slope of the line fit with linear regression
- D) Chi-squared

Question 6 (2 points)

You read in a research paper that the mean length of strömmingar (*Clupea harengus membras*) caught in 2024 was 152 mm, with a 95% confidence interval of 139 mm to 163 mm. What is a 95% confidence interval, and what information does it provide?

Question 7 (1 point)

A group of researchers have measured the body lengths (mm) of 120 adult hussysorsor (*Acheta domestica*). The distribution of body masses has a single peak, with a mean of 18.2 mm and a median of also 18.2 mm. The standard deviation is 1.4 mm. What does this suggest about the shape of the distribution of body lengths?

Choose one:

- A) The distribution is right-skewed (tail extends to the right)
- B) The distribution is left-skewed (tail extends to the left)
- C) The distribution is symmetrical (equal sized tails on either side)
- D) The distribution is leptokurtotic (wide tails and positive kurtosis)

Question 8 (2 points)

What is the purpose of a null distribution in a hypothesis test? How is it used to decide whether to reject or fail to reject the null hypothesis?

Question 9 (1 point)

From a sample (sample size = N), a single bootstrap sample can be generated by which of the following processes?

Choose one:

- A) Randomly resampling $N/2$ values from the original sample without replacement N times
- B) Randomly resampling $N/2$ values from the original sample with replacement N times
- C) Randomly resampling N values from the original sample without replacement
- D) Randomly resampling N values from the original sample with replacement