

8.2.1: Exercises

1. Weaver worker ants have a bimodal length distribution. There are two types of workers, minors and majors. The majors have an average length of 9 mm and standard deviation of 1 mm. The minors average half the length at 4.5 mm and a standard deviation of 0.25 mm. Suppose an entomologist is interested in examining the difference in sample means from independent random samples of major and minor weaver worker ants. They measure the length of 200 major and 250 minor randomly selected worker ants.
 - a. Is the normal distribution an appropriate model for the sampling distribution of the difference in sample means? Explain.
 - b. Compute the mean of the sampling distribution of the difference in sample means, $\mu_{\bar{x}_1 - \bar{x}_2}$.
 - c. Compute the standard error of the sampling distribution of the difference in sample means, $\sigma_{\bar{x}_1 - \bar{x}_2}$. Round to three decimal places.
 - d. Would it be unusual to see a sample mean difference (in majors minus minors) as low as 4.25 mm? Compute a Z-score (rounded to two decimal places) to justify your answer.

2. Research has shown that 13.8% of all females are left-handed and 16.1% of all males are left-handed. Suppose a sociologist would like to understand the differences in sample proportions from independent random samples of females and males. They randomly surveyed 150 females and 175 males.
- Is the normal distribution an appropriate model for the sampling distribution of the difference in sample proportions? Explain.
 - Compute the mean of the sampling distribution of the difference in sample proportions, $\mu_{\hat{p}_1 - \hat{p}_2}$.
 - Compute the standard error of the sampling distribution of the difference in sample means, $\sigma_{\hat{p}_1 - \hat{p}_2}$. Round to three decimal places.
 - Would it be unusual to see a sample proportion difference of -0.002? Compute a Z-score (rounded to two decimal places) to justify your answer.