1. As an ornithologist, you wish to determine the average body mass of *Seiurus noveboracensis*. You randomly capture 31 adults of *Seiurus noveboracensis*, resulting in a sample mean of 20.47 grams and a sample standard deviation of 3.53 grams. You decide to report a 95% confidence interval.

   (a) Determine the lower bound of the confidence interval.

   (b) Determine the upper bound of the confidence interval.

2. A teacher has 6 students who have each taken two quizzes. Perform a two-tail test with significance level 0.04 to determine whether students' performance changed on average.

	student1	student2	student3	student4	student5	student6
quiz 1:	62.9	83.4	55.8	57.7	85.9	62.3
quiz 2:	48.8	78.3	49.1	52.3	88.8	53.9

   (a) State the null hypothesis.

   (b) State the alternative hypothesis.

   (c) Evaluate the critical value. (The critical value is either $z^\star$ or $t^\star$. Determine its value.)

   (d) Determine the standard error of the relevant sampling distribution.

   (e) Evaluate the absolute value of the test statistic. (The test statistic is either z_{obs} or t_{obs}. Determine its absolute value.)

   (f) If possible, evaluate the p-value. Otherwise, describe an interval containing the p-value.

   (g) Do we reject or retain the null?

3. You are interested in whether a treatment causes an effect on a continuously measurable attribute. You use a treatment group with 5 cases and a control group with 5 cases. You decide to run a hypothesis test with a significance level of 0.04. Your data is below. Please use 5 for the degrees of freedom (calculated with the Welch-Satterthwaite equation).

treatment	control
14.8	13.4
12.3	12.2
15.1	10.8
13.4	13
17.7	10.6

   (a) State the null hypothesis.

   (b) State the alternative hypothesis.

   (c) Evaluate the critical value. (The critical value is either $z^\star$ or $t^\star$. Determine its value.)

   (d) Determine the standard error of the relevant sampling distribution.

(e) Evaluate the absolute value of the test statistic. (The test statistic is either z_{obs} or t_{obs}. Determine its absolute value.)

(f) If possible, evaluate the p-value. Otherwise, describe an interval containing the p-value.

(g) Do we reject or retain the null?

4. From a very large population, a random sample of 1300 individuals was taken. In that sample, 81% were blue. Determine a 95% confidence interval of the population proportion.

   (a) Find the lower bound of the confidence interval.

   (b) Find the upper bound of the condifence interval.

5. Your boss wants to know what proportion of a very large population is glowing. She also wants to guarantee that the margin of error of a 99% confidence interval will be less than 0.01 (which is 1 percentage points). How large of a sample is needed? Please round up, using only 2 significant digits.

6. An experiment is run with a treatment group of size 290 and a control group of size 248. The results are summarized in the table below.

	treatment	control
omnivorous	217	171
not omnivorous	73	77

   Using a significance level of 0.2, determine whether the treatment causes an effect on the proportion of cases that are omnivorous.

   (a) State the null hypothesis.

   (b) State the alternative hypothesis.

   (c) Evaluate the critical value. (The critical value is either $z^\star$ or $t^\star$. Determine its value.)

   (d) Determine the standard error of the relevant sampling distribution.

   (e) Evaluate the absolute value of the test statistic. (The test statistic is either z_{obs} or t_{obs}. Determine its absolute value.)

   (f) If possible, evaluate the p-value. Otherwise, describe an interval containing the p-value.

   (g) Do we reject or retain the null?

1. (a) LB = 19.2
   (b) UB = 21.8
2. (a) $H_0 : \mu_{\text{diff}} = 0$
   (b) $H_A : \mu_{\text{diff}} \neq 0$
   (c) $t^\star = 2.76$
   (d) $SE = 1.78$
   (e) $\mid t_{\text{obs}} \mid = 2.724$
   (f) $0.04 < p\text{-value} < 0.05$
   (g) retain
3. (a) $H_0 : \ \mu_2 - \mu_1 = 0$
   (b) $H_0 : \ \mu_2 - \mu_1 \neq 0$
   (c) $t^\star = 2.76$
   (d) $SE = 1.07$
   (e) $\mid t_{\text{obs}} \mid = 2.52$
   (f) $0.05 < p\text{-value} < 0.1$
   (g) retain
4. (a) LB of p CI = 0.789 or 78.9%
   (b) UB of p CI = 0.831 or 83.1%
5. $n \approx 17000$
6. (a) $H_0 : \ p_2 - p_1 = 0$
   (b) $H_A : \ p_2 - p_1 \neq 0$
   (c) $z^\star = 1.28$
   (d) $SE = 0.039$
   (e) $\mid z_{\text{obs}} \mid = 1.49$
   (f) p-value = 0.1362
   (g) reject