

1. 1980, 27% of adults had received music instruction at some point in their life. We would like to know whether the percentage has since decreased. In a sample of 120 adults taken this year, 24 had received music instruction.

a) What would constitute a type I error under the appropriate hypothesis test

b) What would constitute a type II error under the appropriate hypothesis test

c). Conduct the appropriate hypothesis test using  $\alpha = 0.10$

I. State the null and alternative hypotheses

II. Find the p-value

III. Make and justify a decision

IV. Interpret your decision in the context of the problem

d) Interpret your p-value

e) If your decision in your hypotheses test is a mistake, what type of error have you made?

2. In Alaska the average age of Republicans is 42. We would like to know if the average age of Republicans in Illinois is greater than that of Republicans in Alaska. Assume we know the distribution of the age of all Republicans is normal with a standard deviation of 7 years. We take a sample of 11 Republicans in Illinois, and from this sample calculate an average age of 46.

a) What would constitute a type I error under the appropriate hypothesis test

b) What would constitute a type II error under the appropriate hypothesis test

c). Conduct the appropriate hypothesis test using  $\alpha = 0.01$

I. State the null and alternative hypotheses

II. Find the p-value

III. Make and justify a decision

IV. Interpret your decision in the context of the problem

d) Interpret your p-value

e) If your decision in your hypotheses test is a mistake, what type of error have you made?

3. The mean number of hours a 15 year old watches TV a week is 7.2. Assume further that we know the number of hours anyone watches TV per week is normally distributed, with a standard deviation of 3.2 hours. We are interested in whether the mean hours of watching is different for 18 year olds. We take a sample of 4 18 year olds, ask them how many hours they watched TV in the last week, and obtained the following data:

Data: 10 8 13 7

a) What would constitute a type I error under the appropriate hypothesis test

b) What would constitute a type II error under the appropriate hypothesis test

c). Conduct the appropriate hypothesis test using  $\alpha = 0.05$

I. State the null and alternative hypotheses

II. Find the p-value

III. Make and justify a decision

IV. Interpret your decision in the context of the problem

e) If your decision in your hypotheses test is a mistake, what type of error have you made?

4. In 2005 82% of registered voters had voted in the last election. We would like to know whether the percentage has since changed. We take a sample of 180 registered voters and find that 135 of them had voted in the last election.

a) What would constitute a type I error under the appropriate hypothesis test

b) What would constitute a type II error under the appropriate hypothesis test

c). Conduct the appropriate hypothesis test using  $\alpha = 0.05$

I. State the null and alternative hypotheses

II. Find the p-value

III. Make and justify a decision

IV. Interpret your decision in the context of the problem

e) If your decision in your hypotheses test is a mistake, what type of error have you made?