1. An airline claims that the airline rarely loses a passengers checked luggage. In addition, if checked luggage is lost, 90% of the time lost luggage is recovered and returned to the owner within 24 hours. A consumer group believes that actually less than 90% is recovered within 24 hours. The consumer group surveys a large random sample of the airline’s customers and found that 103 of 122 people who had lost checked luggage were reunited with the missing items within 24 hours. Does this sample data cast doubt on the airline’s claim of 90% recovered and returned within 24 hours? To answer this question you should

a) Set up a null and alternative hypotheses. Be sure to state what p represents in your hypotheses.

\[ H_0: p = 0.90 \]
\[ H_A: p < 0.90 \]

*p is the proportion of all lost luggage that is recovered within 24 hours.*

b) Verify that the success/failure condition is satisfied.

\[ np = 122(0.90) = 109.8 > 10 \]
\[ n(1 - p) = 122(1 - 0.9) = 12.2 > 10 \]

c) Calculate the value of the test statistic and convert this to a P-value using Table Z.

\[ \hat{p} = \frac{103}{122} = 0.844 \]
\[ z = \frac{0.844 - 0.9}{\sqrt{\frac{0.9(1 - 0.9)}{122}}} = \frac{-0.056}{0.02716} = -2.06 \]

*Table Z: 0.0197*

P-value = 0.0197

d) Use the P-value to make a decision whether or not to reject the null hypothesis.

*Because the P-value is so small (less than 0.05), we reject the null hypothesis.*

e) State a conclusion, within the context of the problem, which addresses the airline’s claim.

*The proportion of all lost luggage that is recovered within 24 hours is less than 90%. The airline’s claim is not supported by these data.*
2. In the 1980’s it was generally believed that about 5% of all children in the U. S. were
affected by congenital abnormalities. Some people believe that the increase in chemicals in
the environment has led to an increase in the proportion of children in the U. S. with
congenital abnormalities. A recent study examined 384 randomly selected children in the U.
S. and found that 26 had congenital abnormalities. The conditions for doing a test of
hypothesis are met, so you do not need to verify them.

a) What is the population? Be specific.

The population consists of all children in the U.S. when the study was conducted.

b) What is the sample? Be specific.

384 randomly selected children.

c) What is the population parameter of interest?

The population parameter is the proportion of all children in the U.S. at the time of
the study with congenital abnormalities.

d) Give a null and alternative hypothesis for the population parameter.

\[ H_0: p = 0.05 \]
\[ H_A: p > 0.05 \]

e) Compute the value of the test statistic and convert this to a P-value.

\[ \hat{p} = \frac{26}{384} = 0.0677 \]
\[ z = \frac{(0.0677 - 0.05)}{\sqrt{\frac{0.05(1 - 0.05)}{384}}} = \frac{0.0177}{0.01112} = 1.59 \]

Table Z: 0.9441
P-value = 1 – 0.9441 = 0.0559

f) Use the P-value to make a decision whether or not to reject the null hypothesis.

Because the P-value is not small, fail to reject the null hypothesis.

g) State a conclusion, within the context of the problem.

Even though the sample proportion (0.0677) is bigger than 0.05, it is not convincing
evidence that the population proportion of congenital abnormalities at the time of
the study was larger than the 5% that it was in the 1980’s.