

**1. Problem**

An experiment is run with a control group of size 157 and a treatment group of size 180. The results are summarized in the table below.

	treatment	control
special	52	77
not special	105	103

Using a significance level of 0.04, determine whether the treatment causes an effect on the proportion of cases that are special.

- (a) Determine a  $p$ -value.
- (b) Does the treatment have a significant effect? (yes or no)

**2. Problem**

In one sample of 200 cases, 39% are folksy ( $\hat{p}_1 = 0.39$ ). In a second sample of 50 cases, 40.4% are folksy ( $\hat{p}_2 = 0.404$ ). Determine a 99.5% confidence interval of  $p_2 - p_1$ .

- (a) Determine the lower bound.
- (b) Determine the upper bound.

**3. Problem**

In one population, 64.2% are cold ( $p_1 = 0.642$ ). In a second population, 39.2% are cold ( $p_2 = 0.392$ ). When random samples of sizes 700 and 300 are taken from the first and second populations respectively, what is the chance that  $\hat{P}_2 - \hat{P}_1$  is between -0.32 and -0.18?

**4. Problem**

It is generally accepted that a population's proportion is 0.802. However, you think that maybe the population proportion is not equal to 0.802, so you decide to run a two-tail hypothesis test with a significance level of 0.1 with a sample size of 1000.

Then, when you collect the random sample, you find its proportion is 0.82. Do you reject or retain the null hypothesis?

- (a) Determine the  $p$ -value.
- (b) Decide whether we reject or retain the null hypothesis.

**5. Problem**

If you suspect that  $\hat{p}$  will be near 0.33, how large of a sample is needed to guarantee a margin of error less than 0.01 when building a 99.5% confidence interval?

**6. Problem**

A random sample of size 1400 was found to have a sample proportion of 5.3%. Determine a 80% confidence interval of the population proportion.

- (a) Find the lower bound of the confidence interval.
- (b) Find the upper bound of the confidence interval.

**7. Problem**

In a very large population, 88.1% are special. When a random sample of size 4200 is taken, what is the chance that the sample proportion of special individuals is farther than  $\pm 0.5$  percentage points from 88.1%?

1. (a) 0.0672  
(b) no
2. (a) -0.204  
(b) 0.232
3. 0.9634
4. (a) 0.1528  
(b) retain
5. 17446.000
6. (a) 0.0453  
(b) 0.0607
7. 0.3173