1. **Problem**
   An experiment is run with a treatment group of size 221 and a control group of size 270. The results are summarized in the table below.

	treatment	control
cold	112	111
not cold	109	159

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

   (a) Determine a p-value.

   (b) Does the treatment have a significant effect? (yes or no)

2. **Problem**
   In one sample of 100 cases, 40.4% are fluorescent ($\hat{p}_1 = 0.404$). In a second sample of 400 cases, 18.5% are fluorescent ($\hat{p}_2 = 0.185$). Determine a 98% confidence interval of $p_2 - p_1$.

   (a) Determine the lower bound.

   (b) Determine the upper bound.

3. **Problem**
   In one population, 39.2% are sorry ($p_1 = 0.392$). In a second population, 69.5% are sorry ($p_2 = 0.695$). When random samples of sizes 60 and 5000 are taken from the first and second populations respectively, what is the chance that $\hat{P}_2 - \hat{P}_1$ is between 0.29 and 0.316?

4. **Problem**
   It is generally accepted that a population's proportion is 0.393. However, you think that maybe the population proportion is not 0.393, so you decide to run a two-tail hypothesis test with a significance level of 0.02 with a sample size of 4000.

   Then, when you collect the random sample, you find its proportion is 0.413. 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 0.76, how large of a sample is needed to guarantee a margin of error less than 0.04 when building a 99% confidence interval?

6. **Problem**
   A random sample of size 66000 was found to have a sample proportion of 6.4%. Determine a 90% confidence interval of the population proportion.

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

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

7. **Problem**
   In a very large population, 76.8% are happy. When a random sample of size 1600 is taken, what is the chance that the sample proportion of happy individuals is beyond $\pm$ 0.8 percentage points from 76.8%?

1. (a) 0.034
   (b) yes
2. (a) -0.342
   (b) -0.096
3. 0.1664
4. (a) 0.0096
   (b) reject
5. 760.000
6. (a) 0.0624
   (b) 0.0656
7. 0.4654