Week 6 Exercise

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This is my solution to the problem 9.44: *For each of the following problems, use the eight-step approach to test the hypotheses*:

$$a) \quad H_0 : p = .28 \quad H_a : p > .28 \quad n = 783 \quad x = 230 \quad \alpha = 0.1$$
$$b) \quad H_0 : p = .61 \quad H_a : p \neq .61 \quad n = 401 \quad \hat{p} = .56 \quad \alpha = 0.05$$

The Eight Steps of Testing Hypotheses

The eight step approach is:

1. Establish a null and alternative hypothesis.
2. Determine the appropriate statistical test.
3. Set the value of alpha, the Type 1 error rate.
4. Establish the decision rule.
5. Gather sample data.
6. Analyze the data
7. Reach a statistical conclusion
8. Make a business decision

Part a

Steps 1, 3, and 5 are done for us. For step 2, we see that the alternative is testing p greater than .28, so this means we are looking for a one tail test. We can use a z score to see if we can solve for $\hat{p}$ which we *can* do by our known values of x, n, and the formula:

$$\hat{p} = \frac{x}{n}$$

We will reject our null hypothesis if (step 4) our z score is greater than z_α.

```
alpha = 0.1
x = 230
n = 783
p = .28
q = 1 - p
phat = x/n
z = (phat - p)/sqrt((p*q)/n)
"Step 7. We should reject the null hypothesis?"
```

```
## [1] "Step 7. We should reject the null hypothesis?"
```

```
z > pnorm(alpha, 0, 1)
```

```
## [1] TRUE
```

Step 8 is impossible because we are note provided context for the numbers in the problem.

Part b

Steps 1, 3, and 5 are done for us. For step 2, we see that we are looking for non-equality which means we need to do a two tail test. Again, we can use a zscore but this time we will reject the null when our z value to less than $-z_{\alpha/2}$ or greater than $z_{\alpha/2}$.

```
phat = .56
alpha = 0.05
n = 401
p = 0.61
q = 1 - p
z = (phat - p)/sqrt((p*q)/n)
"Step 7. We should reject the null hypothesis"
```

```
## [1] "Step 7. We should reject the null hypothesis"
```

```
z < -pnorm(alpha/2, 0, 1) || z > pnorm(alpha/2, 0, 1)
```

```
## [1] TRUE
```

Again, step 8 is impossible because we are not provided context.