

**Example 6:** Suppose we want to test the claim that the true proportion of people with Type O blood is greater than 40%. When we test the blood of 1000 people we find that 429 of them have Type O blood. Perform a hypothesis test on our claim using the significance level of  $\alpha = 0.05$ .

testing  $p$  - true proportion of people with Type O blood

$$H_0: p = 0.40$$

$$H_1: p > 0.40$$

test stat 
$$Z_{obs} = \frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}} = \frac{429/1000 - 0.40}{\sqrt{\frac{0.40(1-0.40)}{1000}}} = 1.87$$

*from  $H_0$*  (pointing to  $p$  in numerator)  
*Same as in  $H_1$*  (pointing to  $\hat{p}$ )  
*Here we have a value for the population  $p$ , so use  $p$  in denominator.* (pointing to denominator)

$$p\text{-value} = P(Z > 1.87)$$

$$= 1 - P(Z \leq 1.87)$$

$$= 1 - 0.9693$$

$$= 0.0307$$

$$p\text{-value} = 0.0307 \leq \alpha = 0.05 \Rightarrow p\text{-value is small} \Rightarrow \text{reject } H_0.$$

We conclude there is enough evidence to say that the proportion of people with Type O blood is greater than 40%.