

# VA Senate Race 2014



# June 13 Rasmussen Poll

- Sample:
  - 750 Likely Voters in VA
  - 398 Favor Mark Warner (D)
- What is the parameter and population we are interested in?
- Construct a 95% confidence interval for the proportion of likely voters who plan to vote for Mark Warner.
  - Round to three (3) significant figures.
- Explain what the 95% confidence interval means.

# Step 1: Find the Point Estimate

- Find p-hat and q-hat.

$$n = 750$$

$$x = 398$$

$$\hat{p} = \frac{x}{n} \quad \hat{p} = \frac{398}{750} = 0.531$$

$$\hat{q} = 1 - \hat{p} \quad \hat{q} = 1 - 0.531 = 0.469$$

## Step 2: Check $np$ and $nq$ .

- The following must hold true.

$$n\hat{p} > 5 \quad 750(0.531) = 398.25$$

$$n\hat{q} > 5 \quad 750(0.469) = 351.75$$

# Step 3: Find the Margin of Error (E)

- Formula for E:

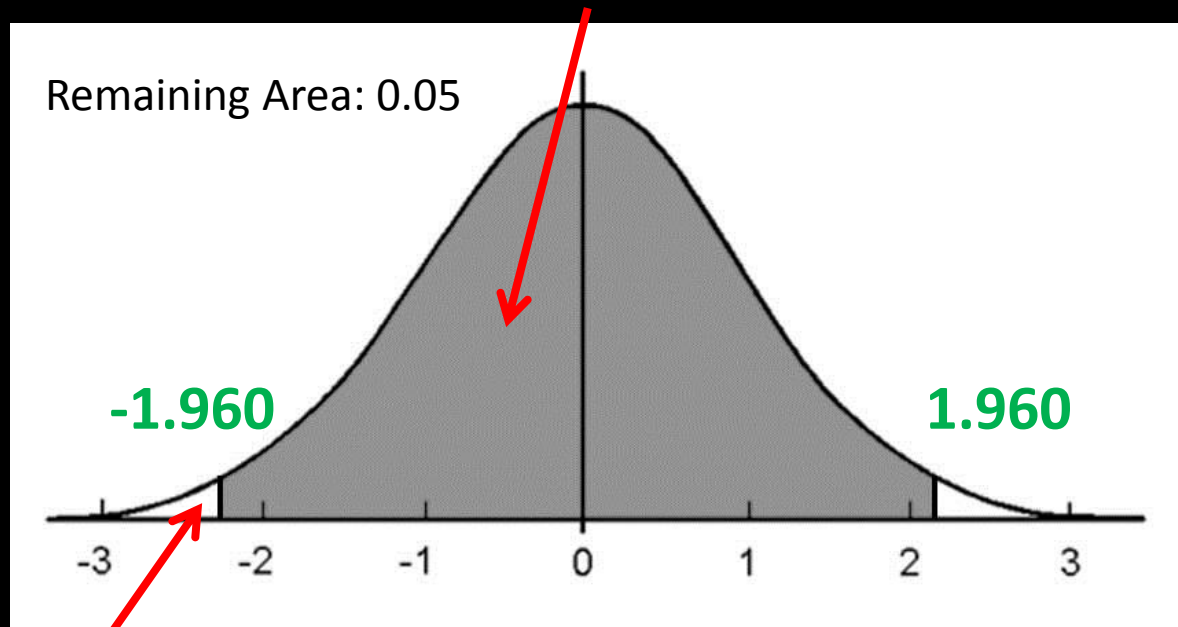
$$E = Z_c \sqrt{\frac{\hat{p}\hat{q}}{n}}$$

- $Z_c$  is the critical value for the corresponding “c” level of confidence.
- We want 95% confidence so we’ll need to find  $Z_{95}$ .

# Finding the Critical Value $Z_{95}$

Round to four sig figs

We want this area to be 0.95.



This means that each tail has  
 $0.05/2 = \underline{0.025}$ .

$$Z_c = 1.960$$

# Step 3: Find the Margin of Error (E)

- Formula for E:

$$E = Z_c \sqrt{\frac{\hat{p}\hat{q}}{n}}$$

$$E = 1.96 \sqrt{\frac{(0.531)(0.469)}{750}}$$

$$E = 0.0357$$

$$n = 750$$

$$\hat{p} = 0.531$$

$$\hat{q} = 0.469$$

$$Z_c = 1.960$$

## Step 4: Set up the Confidence Interval

- Looks like this:

$$\hat{p} - E < p < \hat{p} + E$$

- Our confidence interval is essentially our sample proportion plus/minus the Margin of Error (E).

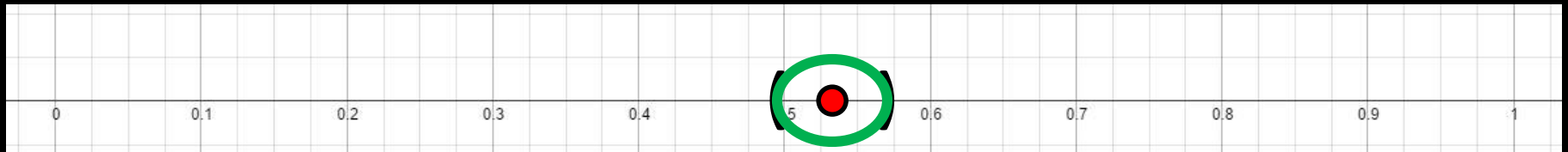


$$\hat{p} - E < p < \hat{p} + E$$

$$0.531 - 0.0357 < p < 0.531 + 0.0357$$

$$0.494 < p < 0.566$$

● Sample Statistic = 0.53



95% confidence interval for likely voters voting for Mark Warner.

**TASK**

# Interpreting the Result

95% confidence level means the following:

If repeated samples were taken, and a 95% confidence interval was computed for each sample, 95% of them would contain the population parameter.

So ...

95% of the samples of 750 likely voters will make an interval which will have the actual percentage of likely voters that will vote for Mark Warner.

# Fine Print Below

The survey of 750 Likely Voters in Virginia was conducted on June 11-12, 2014 by Rasmussen Reports. The margin of sampling error is +/- 4 percentage points with a 95% level of confidence. Fieldwork for all Rasmussen Reports surveys is conducted by [Pulse Opinion Research, LLC](#). See [methodology](#).

# Review + 2000 Florida Election

## Proportions



A proportion measures the fraction of observations that have some characteristic...

The image features a central black circle surrounded by several concentric red rings that create a tunnel-like effect. A white, stylized, cursive letter 'J' is positioned on the left side, overlapping the red rings. The background outside the red rings is black.

J