Name: ______________________________ Hour: _____ Date: ______

Lesson 10.1: Day 2: Which gender uses Twitter more?

n_1 $\hat{p}_1 = \frac{110}{200} = .55$

A recent random sample of 200 U.S. females revealed 110 use Twitter regularly. A separate random sample of 150 males revealed that 60 use Twitter regularly. Construct a 95% confidence interval for the true difference in proportions who use Twitter regularly (females – male).

n_2 $\hat{p}_2 = 60/150 = .40$

STATE: State the parameter you want to estimate and the confidence level.

Parameter: $p_1 - p_2 \rightarrow$ true difference in proportions (females – males)

Statistic: $\hat{p}_1 - \hat{p}_2 = .55 - .40 = .15$

Confidence level: 95%

PLAN: Identify the appropriate inference method and check conditions.

Name of procedure: Two Sample Z interval for $p_1 - p_2$

Check conditions:

10%
$200 < \frac{1}{10}$ all females
$150 < \frac{1}{10}$ all males

Random:
"RS of 200 U.S. females"
"RS of 150 males"

Large Counts
$200 \times .55 = 110$
$200 \times .45 = 90$
$150 \times .40 = 60$
$150 \times .60 = 90$
≥ 10 ✓

DO: If the conditions are met, perform the calculations.

General Formula: Point Estimate ± margin of error

Specific Formula: $(\hat{p}_1 - \hat{p}_2) \pm z^* \sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}}$

Work: $.15 \pm 1.96\sqrt{\frac{.55 \times .45}{200} + \frac{.4 \times .6}{150}}$

Answer: $.15 \pm .104 \rightarrow (.046, .254)$

CONCLUDE: Interpret your interval in the context of the problem.

Interpret: We are 95% confident that the interval from .046 to .254 captures the true difference in proportions of females to males who use twitter. We estimate females use twitter 4.6% to 25.4% more than males.

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Name: ______________________________ Hour: _____ Date: ______

Lesson 10.1: Day 2: Confidence Interval for a Difference in Proportions

Important ideas:

LT#1 2 sample z interval for $p_1 - p_2$

$p_1 - p_2$ → true difference in proportions

$\hat{p}_1 - \hat{p}_2$ → statistic

$$(\hat{p}_1 - \hat{p}_2) \pm z^* \sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}}$$

LT#2 Interpreting

If the interval is:

(+, +) → p_1 is greater

(−, −) → p_2 is greater

(−, +) → we don't know which is greater. may be no difference.

Check Your Understanding

A Pew Research Center poll asked independent random samples of working women and men how much they value job security. Of the 806 women, 709 said job security was very or extremely important, compared with 802 of the 944 men surveyed. Construct and interpret a 95% confidence interval for the difference in the proportion of all working women and men who consider job security very or extremely important.

$\hat{p}_1 = \frac{709}{806} = .88$

$\hat{p}_2 = \frac{802}{944} = .85$

95% confidence

State: $p_1 - p_2$ → true difference in the proportion of working women and men who consider job security very important.

Plan: Two sample z interval for $p_1 - p_2$

Random
"RS. of women and men"

10%
$806 < \frac{1}{10}$ all working women
$944 < \frac{1}{10}$ all working men

Large counts:
$806 \times .88 = 709$ $\quad$ $944 \times .85 = 802$
$806 \times .12 = 97$ $\quad$ $944 \times .15 = 142$ $\quad \geq 10$ ✓

Do: Pt. Est ± M.O.E.

$$\hat{p}_1 - \hat{p}_2 \pm z^* \sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}}$$

$$.88 - .85 \pm 1.96\sqrt{\frac{.88 \times .12}{806} + \frac{.85 \times .15}{944}} \rightarrow (-.0019, .0621)$$

Conclude: We are 95% confident that the interval from −.0019 to .062 captures the true diff. (women − men) in proportions of working men and women.