1. a) $\hat{p} = 0.66 \quad n = 1018$

$\alpha = 1 - 0.95 = 0.05$

$z\text{-value} = z_{\alpha/2} = z_{0.05/2} = 1.96$

$$SE = \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

$$= \sqrt{\frac{0.66 \cdot 0.34}{1018}}$$

$$\approx 0.014847$$

$$E = z_{\alpha/2} \cdot \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

$$= 1.96 (0.014847$$

$$\approx 0.0291$$

$MOE = 0.0291$

$\approx 3\%$

b) lower $= \hat{p} - E$

$= 0.66 - 0.0291$

$\approx 0.6309$

upper $= \hat{p} + E$

$= 0.66 + 0.0291$

$\approx 0.6891$

CI: $0.631 < p < 0.689$

no, the poll provides evidence
less than 70% of population
thinks that

2. a) 61% is a sample statistic because it
represents the sample of the data

b) $p = 0.61$ $n = 1578$

$$p \pm z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

$$= 0.61 \pm 1.96 * \sqrt{\frac{0.61(1-0.61)}{1578}}$$

$= 0.5859, 0.6341$

c) $n * p = 1578 * 0.61 \geq 10$

$n * (1-p) = 1578(1-0.61) \geq 10$

Normally Distributed

d) The claim can be supported as CI's lower
is over 0.5

3. a) $H_0: p = 0.5$

$H_a: p > 0.5$

$\hat{p} = \frac{x}{n} = 0.48 \qquad n = 331$

moe $\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = 0.02748$

$\alpha = 0.05$

$$z = \frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}}$$

$= -0.73$

p value = 0.7673, right tail

We cannot reject the null as $p \geq \alpha$

b) yes, as based on the result the CI would contain the value 0.5

4.

| | control | Treat | Total |
|---|---|---|---|
| alive | 4 | 24 | 28 |
| dead | 30 | 45 | 75 |
| | 34 | 69 | 103 |

$\hat{p}_1 = \frac{4}{34}$

$= 0.12$

$\hat{p}_2 = \frac{24}{69}$

$= 0.35$

$n_1 \hat{p}_1 \geq 10$

$34(0.12)$

$= 4.08$

$< 10$

normal approximation wouldn't work
The conditions for normal approximation are not met, so we can't make a CI using normal approximation.

5. a) True

$\alpha = 0.05$

$Z = 1.96$

CI $(-0.16, 0.02)$

$\hat{p}_1 - Z \cdot sd = -0.16$

$\hat{p} + Z * sd = 0.02$

$2 * (0.02 - 0.16 = -0.14)$

$= 0.14 / 2 = -0.07$

$= \dfrac{(-0.07 + 0.16)}{1.96}$

$= 0.046$

$H_0 : \mu = 0$

$H_a : \mu <> 0$

$\alpha = 0.05$

$t = p / sd = -0.07 / 0.046 = -1.52$

p-value = 1, 52, 614 − 2, 2)

= 0.128

$p > 0.05$, we fail to reject the null

There's no difference between the 2 groups

b) False

c) False, a 99% CI is bigger than 90%

$z$ for 99% > 90% CI

d) True, CI will change cus' we are looking

for $\mu_2 - \mu_1$ now.

6. $(1-\alpha) = 0.95$

$\alpha = 0.05$

$z_{0.05}$, $P(Z \leq z) = 0.05$

$P(Z \leq 1.96) = 0.05$

$p_1 = 0.08$ $p_2 = 0.088$ $n_1 = 11,545$ $n_2 = 4,691$

$$CI = (0.08 - 0.088) \pm 1.96 \sqrt{\frac{0.08(1-0.08)}{11,545} + \frac{0.088(1-0.088)}{4,691}}$$

$= -0.008 \pm (1.96 \cdot \sqrt{0.00002348})$

$= -0.08 \pm (1.96 \cdot 0.0048)$

$= -0.008 \pm 0.0095$

$= (-0.008 - 0.0095,\ 0.23 + 0.0386)$

$CI = (-0.0175, 0.0015)$

7. $H_0: p_1 = p_2$

$H_a: p1 \neq p2$

$$z = \frac{(.088 - .08)}{\sqrt{\frac{.088 \cdot (1-.088}{4691} + \frac{0.08(1-.08)}{11545}}}$$

$= 1.65$

p-value $= .099$

There is no strong evidence $(.099 > .05)$ the rates of sleep deprivation are diff

b) If there is an error it would be a Type 2 error, a failure to reject the null