STAT 515 Homework #3 - Mathew Houser

6.38 (a) $\mu_{\bar{x}} = \$3.65$ $\sigma_{\bar{x}} = 0.015$

(b) 0.4088 $z = 1.33$

(c) 0.0912 $0.5 - (b)$

(d) if $n = 200$, $\mu_{\bar{x}} = \$3.65$, $\sigma_{\bar{x}} = 0.0106$

(b) → 0.4699 (c) → 0.0301

6.58 (a) $p = E(\hat{p}) = 0.33$

$\sigma_{\hat{p}} = \sqrt{0.33(1-0.33)/1000} = 0.01487$

$(1000)(0.33) \geq 15$ ✓ $(1000)(1-0.33) \geq 15$ ✓

(b) $P(\hat{p} < 0.40) = P(z < 4.7075) \approx .9999$

$z = \dfrac{0.40 - 0.33}{0.01487}$ It is almost certain that in a sample of 1000 people, less than 400 believe that finding and picking up a penny is good luck.

(c) $P(\hat{p} > 0.30) = P(z > -2.0175) = 0.9783$

$z = \dfrac{0.30 - 0.33}{0.01487}$ In a random sample of 1000 people, we would expect more than 300 people to believe that finding and picking up a penny is good luck 97.83% of the time.

7.36 (a) 80% CI = (93.7004, 102.1796)

$n = 16$ $df = 15$ $t_{0.10}$ $\bar{x} \pm t^* \frac{s}{\sqrt{n}}$

(b) 95% CI = (91.2028, 104.6772)

$n = 16$ $df = 15$ $t_{0.025}$ $\bar{x} \pm t^* \cdot \frac{s}{\sqrt{n}}$

(c) We are 80% certain that the true population mean falls between 93.7004 and 102.1796. We are 95% confident that the true population mean falls between 91.2028 and 104.6772. The 80% CI is more narrow because we used a smaller portion of the area under the curve (α)

7.38 (a) 99% CI = (49.1365, 57.6635)

$\bar{x} = 53.4$ $\quad s = 8.6$ $\quad t_{0.005}$ Assume Normal

(b) Larger, 31 is significantly lower than the CI.

(c) Smaller, 58 is greater than the C.I.

7.60 (a) $\hat{p} = 81/170 = 0.4765$

(b) 90% CI = (0.4135, 0.5395)

$\hat{p} \pm z_{0.05} \cdot \sigma_{\hat{p}}$ $\qquad \sigma_{\hat{p}} = \sqrt{pq/n} = 0.0383$

(c) We are 90% confident that the true proportion of all meaningful interactions led by children in the Children's Museum is between 41.35% and 53.95%.

(d) The Claim that the True Proportion is 35% is very unlikely because it is quite distant from the values produced in our 90% CI.

7.84 (a) $z_{0.005} = 2.576$ $\qquad n = \frac{z^2 s^2}{SE^2}$

(c) n = 55

7.88 n = 1692 $\qquad n = \frac{z_{0.05}^2 (.5)(.5)}{(.02)(.02)}$

Assume p = 0.5