Statistics for the Life Sciences

Math 20340 Section 01, Fall 2008

Homework 7 Solutions

- **8.40**:
  - **a**: 90% confidence interval: $-2.2 \pm 1.645 * \sqrt{\frac{.83}{64} + \frac{1.67}{64}} = -2.2 \pm .32....$ "90% confident" means (informally) that the probability that the true difference between the means lies in the constructed interval is $.9$; formally it means that a process is being used to construct the interval that 90% of the time it is performed will lead to an interval which contains the true difference.
  - **b**: 99% confidence interval: $-2.2 \pm 2.58 * \sqrt{\frac{.83}{64} + \frac{1.67}{64}} = -2.2 \pm .50....$ Since 0 is not in this confidence interval, and we would expect it to be if the two means were the same, then we can be reasonably (99%, at least) confident that the two means are different.
- **8.42**: 90% confidence interval: $-.7 \pm 1.645 * \sqrt{\frac{1.44}{100} + \frac{2.64}{100}} = -.7 \pm .332....$ Since 0 is not in this confidence interval, and we would expect it to be if the two means were the same, then we can be reasonably (90%, at least) confident that the two means are different; and more over that region 2 has a greater number of calls on average.
- **8.48**:
  - **a**: 99% confidence interval: $-8 \pm 2.58 * \sqrt{\frac{4^2}{30} + \frac{10^2}{40}} = -8 \pm 4.49....$
  - **b**: Since 0 is not in this confidence interval, and we would expect it to be if the two means were the same, then we can be reasonably (99%, at least) confident that the two means are different; and more over that the experimental group has a greater mean.
- **8.50**:
  - **a**: $\frac{120}{500} - \frac{147}{500} = -.054$.
  - **b**: $SE \approx \sqrt{\frac{.24*.76}{500} + frac.294 * .706500} = .0279....$
  - **c**: 95% margin of error: $\pm 1.96 * .0279... = \pm .0547....$
- **8.54**: Estimate for difference of proportion ($D - R$): $.44 - .41 = .03$. 95% confidence margin of error: $\pm 1.96 * \sqrt{\frac{.44*.56}{1094} + frac.41 * .59995} = \pm .0424$. Since 0 is within the margin of error of the observed difference, we can't really conclude anything about whether

there is a difference between proportion of Republicans and Democrats who consider the economy an important issue.

- **8.59**: $\hat{p}_G = 126/180 = .7$; $\hat{p}_{NG} = 54/100 = .54$. 90% confidence interval for the difference: $.16 \pm 1.645 * \sqrt{\frac{.7*.3}{180} + \frac{.54*.46}{100}} = .16 \pm .099....$ Since the interval contains only positive values, we can be (at least) 90% confident that the proportion of first-borns among college grads is higher than the proportion among non college grads.

- **8.62**:

  - **a**: $\hat{p}_{>1000} = \frac{23}{41} = .56...$; 95% confidence margin of error is $\pm 1.96\sqrt{\frac{\frac{23}{41}\frac{18}{41}}{41}} = \pm .1519....$
  - **b**: $\hat{p}_{>1000} - \hat{p}_{<1000} = .24...$; 95% confidence margin of error is $\pm 1.96\sqrt{\frac{\frac{23}{41}\frac{18}{41}}{41} + \frac{\frac{10}{32}\frac{22}{32}}{32}} = \pm .221....$

- **8.65**:

  - **a**: $\leq \bar{x} + 1.28 * \frac{s}{\sqrt{n}} = 76.63....$
  - **b**: ≤ 1.8944.

- **8.66**: $\geq \hat{p} - 2.33 * \sqrt{\frac{\hat{p}\hat{q}}{n}} = .4317....$

- **8.68**: Want $1.96 * \frac{12.7}{\sqrt{n}} \leq 1.6$ or $n \geq 243$ (n must be a whole number).

- **8.70**: Want $1.645\sqrt{\frac{27.8}{n} + \frac{27.8}{n}} \leq .17$ or $n \geq 5207$.

- **8.75**: Range is 104, so use $104/4 = 26$ as estimate for σ. Want $2.58\sqrt{\frac{26^2}{n} + \frac{26^2}{n}} \leq 5$ or $n \geq 360$.

- **8.80**: Want $1.96\sqrt{\frac{.6^2}{n} + \frac{.6^2}{n}} \leq .2$ or $n \geq 70$.