MAT 223, Discussion Questions 11.13

1. The weights for a population of North American raccoons have a bell-shaped frequency curve with a mean of about 12 pounds and a standard deviation of about 2.5 pounds based on sample size of 68. Construct an 80% confidence interval and a 90% confidence interval. What do you notice about the two intervals?

Z-Interval
Stats

$\sigma = 2.5$
$\bar{X} = 12$
$n = 68$

Same

Higher confidence has a wider interval

C-level: .80   C-level: .90
(11.611, 12.389)   (11.501, 12.499)

2. In a simple random sample of 144 households in a county in Virginia, the average number of children in these households was 3.62 children. The standard deviation from this sample was 2.40 children. What is a 90% confidence interval for these results? What does it mean in the context of the problem?

T-Interval (Stats) (better; z ok)

$\bar{X} = 3.62$
$S_x = 2.40$
$n = 144$
C-level: .9

we are 90% sure that the true mean # of children in the county per family is between 3.1 and 4.1 kids.

(3.1346, 4.1054)

3. Suppose that a simple random sample of 100 men in Richmond were asked how much money they spent per visit at the barbershop. The responses resulted in a mean of $21.43 and a standard deviation of $7.84. Calculate a 95% confidence interval for these results.

T-Interval (Stats) (better, z ok)

$\bar{X} = 21.43$
$S_x = 7.84$
$n = 100$
C-level: .95

(19.874, 22.986)

4. Redo the problem above but find a 99% confidence interval, and assume the data came from a sample size of 172 men. What do you notice about the two intervals? What can you conclude from this?

T-Interval (Stats)
Change $n = 172$
C-level: .99

$(19.873, 22.987)$

increasing the sample size offsets the increase in confidence level

5. Redo the above problems with a t-distribution instead of the standard normal distribution. What do you notice about the intervals?

Z-intervals

Z intervals are all narrower than their T-counterparts

2. $(3.291, 3.949)$

3. $(19.893, 22.967)$

4. $(19.89, 22.97)$

6. Calculate an 80% confidence interval for a sample with a mean of 54 and a standard deviation of 2.2. Assume the sample size is $n = 6$ and $n = 50$. Calculate the interval in each case with a z-score and a t-value. How do the results differ? What do you notice about the effect of the sample sizes and how it affects the results?

T-Interval (Stats)
$\bar{X} = 54$
$S_x = 2.2$
$n = 6$ $n = 50$
C-level: .8
$(52.674, 55.326)$ $(53.596, 54.404)$

increasing sample size reduces the width of the confidence interval

7. Comment on the article at http://www.edutopia.org/blog/9-strategies-motivating-students-mathematics-alfred-posamentier.