MAT 223, Discussion Questions 11.09

1. What is a point estimate for a parameter? What are the downsides of using point estimates?

a single value used to estimate an unknown population parameter. Downside is that the value is certainly off but doesn't provide any info on reliability & accuracy.

2. Give an example of an unbiased estimator and what parameter it can estimate.

$\bar{x}$ for μ, or $\tilde{x}$ for μ or mode for μ

S for σ

3. Why are interval estimates better than point estimates?

gives info on precision & reliability

4. What is the most common confidence level used for confidence intervals?

95%

5. What is the margin of error? How is it calculated?

$$M \text{ of } E = \frac{Z_{\alpha/2} S}{\sqrt{n}}$$ (or E) (S or σ) for means $\quad Z_{\alpha/2}\sqrt{\frac{p(1-p)}{n}}$ for proportion

6. Give at least five of the most common z-values for common confidence intervals.

$1-\alpha$	$Z_{\alpha/2}$
95%	1.96
90%	1.645
99%	2.575

other values may vary

7. Interpret in words a 95% confidence interval for a mean of (50.1, 56.3) in a complete sentence.

We are 95% sure that the true value of the population mean is between 50.1 and 56.3.

8. Suppose that you have a mean distributed normally with a standard deviation of 14. How big a sample size is needed to estimate, with 95% confidence, the true value of the mean within one unit ($E = 1$).

$$n = \left(\frac{z_{\alpha/2} \, s}{E}\right)^2$$

$$n = \left(\frac{1.96 \cdot 14}{1}\right)^2 = 752.9536$$

$$\Rightarrow n = 753 \text{ or higher}$$

9. Comment on the article at
http://www.slate.com/articles/technology/technology/2013/02/should_algebra_be_in_curriculum_why_math_protects_us_from_the_unscrupulous.html.