Final Exam Questions

Some of these questions will be on the final exam.

1. What is the difference between a statistic and a parameter?
2. The concept of p-value is one of the central ideas of statistical inference. P-values are calculated based on many different distributions. Discuss the definition of p-value and explain why it is so universal for hypothesis testing in statistics.
3. Why is random sampling important?
4. Why are large samples better than small samples?
5. Use the Central Limit Theorem to explain the difference between the sampling distribution for x and $\bar{x}$.
6. Discuss the difference between an experiment and an observational study.
7. When we find a 95% confidence interval for a parameter, what are we 95% sure is true?
8. When we work with $\hat{p}$, we act as though it has a normal distribution. This is not really true. What probability distribution would be a more accurate model for the distribution $\hat{p}$ when we take a small sample from a large population? Why is it sometimes OK to pretend that $\hat{p}$ has a normal distribution?
9. Explain the difference between sample bias and random error.
10. Discuss the similarities and differences between the t-distribution and the z-distribution.
11. What is the Law of Large Numbers, and what does it have to do with gambling in a Las Vegas casino?
12. Explain the difference between explanatory, response, and lurking variables.