Reminders: HW #7 due on Halloween (Monday)
   Reading: 6.2 for Friday, 7.1 for Monday
   Exam 2: Two weeks from Friday, Sample exams on Website Friday

Brief discussion: Binomial probability problems from Monday
   Ingredients:
      Estimate – our counts
      Expectation – Our binomial distributions

Those problems, computing the probability of an observed outcome, and comparing
it to an expectation drawn from some sampling distribution, begin our study of
 Statistical Inference.

Inference for Sample Statistics 1: confidence intervals

Recall: Any sample statistic, a mean for example, is an estimate of some underlying,
frequently unknown population parameter.

In drawing any conclusion from such an estimate, we need to assess our level of
confidence in the estimate. We do this using probability calculations.

Confidence Interval: estimate ± margin of error

   A level C confidence interval (C.I.) for a parameter (say \( \theta \)) is an interval between
   L (lower bound) and U (upper bound), such that \( P(L \leq \theta \leq U) = C \).

Thus, there is a 100*C% chance that the true parameter value falls within the C.I.

Confidence Interval for a Sample Mean \( \bar{x} \)

Sampling distribution of a sample mean: \( N(\mu, \frac{\sigma}{\sqrt{n}}) \) (Remember the CLT!!)

Because Normal distributions are symmetrical around the mean, the margin of error
around \( \mu \) that contains fraction C of the sample mean estimates is just a multiple of the
standard deviation of the sampling distribution \( \frac{\sigma}{\sqrt{n}} \), which we show as \( z^* \frac{\sigma}{\sqrt{n}} \).

Thus, there is a 100*C% chance (based on a sample of size n) that the true mean is
between \( \bar{x} - z^* \frac{\sigma}{\sqrt{n}} \) and \( \bar{x} + z^* \frac{\sigma}{\sqrt{n}} \) and we can state the C.I. as \( \bar{x} \pm z^* \frac{\sigma}{\sqrt{n}} \)

Behavior of the confidence interval for the sample mean
As C goes up, so does the margin of error (z*). Based on your knowledge of Normal distributions, what is z* (approximately) for the following C.I.s?

1. 68% C.I.?
2. 95% C.I.?
3. 99.7% C.I.?

So as C goes up does the C.I. get wider or narrower?
As the sample size goes up, does the C.I. get wider or narrower?

Class Exercises: see handout