Statistics 211
In-Class Assessments
Topic: Chapter 7
Date: Oct. 27, 2016

Consider an IID sample $X_1, X_2, \ldots, X_{100}$ from a distribution with mean $\mu = 0$ and standard deviation $\sigma = 1$.

1. According to the Central Limit Theorem (CLT), what is the approximate sampling distribution of the sample mean $\bar{X}$?

   (a) $N(\mu = 0, \sigma = 10)$.
   (b) $N(\mu = 0, \sigma = 1)$.
   (c) $N(\mu = 0, \sigma = 0.1)$.
   (d) $N(\mu = 0, \sigma = 0.01)$.

   answer: c

2. Suppose we observe a sample mean of $\bar{x} = 0.58$ and a sample standard deviation of $s = 0.8$.

   (a) What is an approximate 95% confidence interval for μ? Note that since $\bar{X}$ is approximately Normal (by the CLT), and since approximately 95% of a Normal distribution is within 2 standard deviations of the mean, you can compute this as $\bar{x} \pm 2 \times \text{s.d. of } \bar{x}$.

      i. $[0.42, 0.74]$.
      ii. $[0.50, 0.66]$.
      iii. $[0.54, 0.62]$.
      iv. $[0.56, 0.60]$.

      answer: a

   (b) Consider testing $H_0 : \mu = 0.5$ vs. $H_a : \mu > 0.5$. What is the p-value? To answer this, first figure out how many standard deviations (of $\bar{X}$) away from $\mu = 0.5$ our observed value of $\bar{x}$ is. Then, the p-value is an appropriate tail probability from the Normal distribution, and you can use the "68 / 95 / 99.7" rule to compute it. Answer to two significant figures.
      answer: 0.16