

SOC510 Homework #6: Chapters 8 and 11–Solution

Chapter 8: bbccc cbbcb

Chapter 11

1. A random sample of size 36 is to be selected from a population that has a mean μ of 50 and a standard deviation σ of 10.

(a) Approximately normal distribution

(b) 50

(c) $\sigma_{\bar{x}} = 10/\sqrt{36} = 1.67$

2. Do the following exercise from the textbook (you should show your work, not just answers):

11.1 Both 283 and 311 pushes per minute are statistics (related to one sample: the subjects with placebo, and the same subjects with caffeine).

11.3 2.5003 cm is a parameter (related to the population, i.e., the whole lot); 2.5009cm is a statistic (related to the sample of 100 ball bearings).

11.6 (a) $\mu = 694/10 = 69.4$. (b) The table below shows the results for line 116. Note that we need to choose 5 digits, because the digit 4 appears twice. (When choosing an SRS, no student should be chosen more than once.) (c) The results for the other lines are in the table; the histogram is shown on the right below. (Students might choose different intervals than those shown here.) The center of the histogram is a bit lower than 69.4 (it is closer to about 67), but for a small group of x-values, we should not expect the center to be in exactly the right place.

11.8 (a) $\sigma/3 = 5.7735$ mg. (b) Solve $\sigma/n = 5$: $n = 2$, so $n = 4$. The average of several measurements is more likely than a single measurement to be close to the mean.

11.12 (a) Ramon's score is about the 64th percentile: $P(X \leq 1100) = P(z \leq \frac{1100-1026}{209}) = P(Z \leq 0.35) = 0.6368$. (b) $x = 1100$ is about the 99.9th percentile: \bar{x} is approximately Normal with mean 1026 and standard deviation $209/\sqrt{70} = 24.9803$, so $P(x \leq 1100) = P(Z \leq 2.96) = 0.9985$. (c) The first answer is less accurate: The distribution of an individual's score (like Ramon's) might not be Normal, but the central limit theorem says that the distribution of \bar{x} will be close to Normal.

11.20: (a) The mean of the sample means ($\mu_{\bar{x}}$) is the same as the population mean (μ_x).

11.22: (a) "Unbiased" means that the estimator is right "on the average."

11.24: (a) The mean \bar{x} of the four inspected parts has a $N(40.150mm, 0.0015)$ distribution, so 40.148 mm is about 1.33 standard deviations below the mean; Table A gives a probability of 0.0918 below this point.