

HW 7.1 Part B pages 429-430 prob 9, 11, 13, 17-20

9)

a) This is not the exact sampling distribution, b/c that would require a value of \hat{p} for all possible samples of size 100. It is an approximation of the sampling distribution that we created through simulation.

b) The distribution is roughly symmetric, roughly bell shaped, and centered around 0.60. Values vary from 0.47 to 0.74. The values of outliers are 0.47, 0.73, and 0.74.

c) If we found that only 45 students said they did all their homework last week, we would be skeptical of the newspaper's claim that 60% of students did their homework last week. None of the simulated samples had a proportion this low. $(.45)$ $(45/100 = .45)$

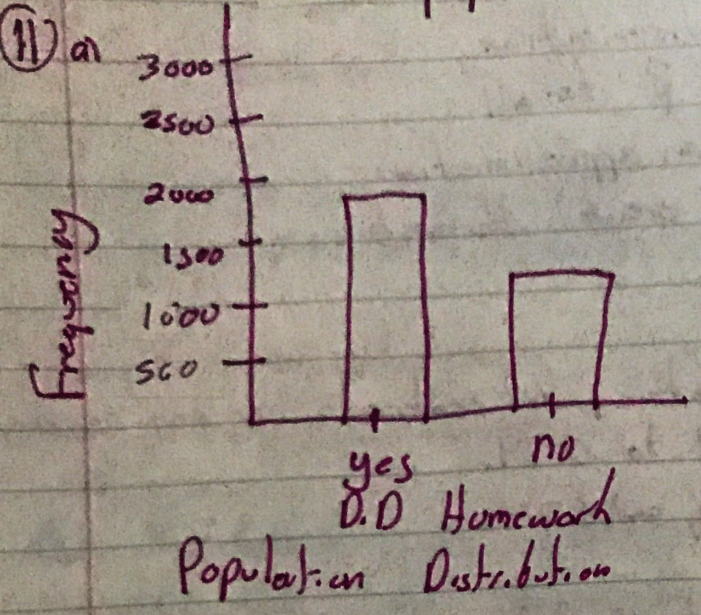
10)

a) No. This is not the exact sampling distribution, because that would require a value of \bar{x} for all possible samples of size 20. It is an approximation of the sampling distribution that we created through simulation.

b) The distribution is roughly symmetric and centered around 0.64. Values vary from 0.4 to 0.7. There do not appear to be any outliers.

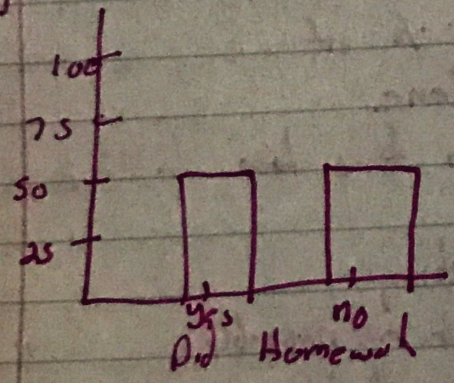
c) If we found the sample mean was 0.47, we could ^{likely} conclude that the population mean height for females could be 0.64. In our simulation, we found values of 0.47 or larger in about 10% of the runs.

with $p = .60$
for yes



Let population = 3000
yes homework $.60(3000) = 1800$
no homework $.40(3000) = 1200$

b) $n = 100$ $\hat{p} = .50$



* There are other possible *
answers. Could sketch
for different \hat{p} values

Distribution of sample results

13) a) The approximate sampling distribution is skewed right and centered around 9. The values vary from about 2° to 27.5° F.

b) A sample variance of 25 is quite large compared to what we would expect (There is only 1 sample that has a variance of 25 or higher). This suggests claim is false and that the thermostat actually has more variability than claimed.

(17) a) SRS = 2000

✓ 10% rule

$$10(2000) \leq 15,000,000 \quad \therefore 10(2000) \leq 240,000$$

✓'s for California

✓'s for Wyoming

Since the smallest # of total tax returns (which is Wyoming) is still more than 10 times the sample size, the variability of the sample proportion will be approximately the same for all states.

b) Yes, the sampling variability will change if SRS is 1% of tax returns from each state. SRS of 1% of Wyoming is 2400, while 1% of California is at least 150,000. Since California's sample size is larger it will have less variability.

(18) a) A larger sample does not reduce the bias of a poll result. It is the sampling technique that will cause bias, and simply increasing the sample size will not reduce bias.

b) A larger sample will reduce the variability of the result. More people means more information, which means less variability.

(19) a) Graph (c) shows the most unbiased estimator b/c the mean of the distribution is very close to population parameter

b) Graph (b) shows the statistic that does the best job at estimating the parameter. Although it is biased, it is very small and the statistic has very little variability.

(20) a) If we choose many samples, the average of all the \bar{x} values from these samples will be close to μ . In other words, the sampling distribution of \bar{x} is centered at the population mean μ that we are trying to estimate.

b) A larger sample will give more information and, therefore, more precise results. The variability in the distribution of the sample average decreases as the sample size increases.