

Statistics 213 Assignment 5

Note: answers may vary slightly due to rounding

1. A newspaper advertisement claims that 55% of the people who wear contact lenses experience no difficulty. In a random sample of 300 people who have purchased contact lens,
 - (a) What's the probability of at least 150 people having no problems? { .9641 }
 - (b) What's the probability of having between 145 and 170 (inclusive) people having no problems? { .7302 }
 - (c) What's the probability of having less than 160 having no problems? { .2611 }

2. According to one study, $\frac{2}{3}$ of all Canadians have at least 2 televisions. In a random sample of 1000 Canadians,
 - (a) What's the probability of exactly 668 Canadians having at least 2 televisions? (use approximation) { .0239 }
 - (b) What's the probability of between 640 and 670 (exclusively) Canadians having at least 2 televisions? { .5361 }
 - (c) What's the probability of greater than 670 Canadians having at least 2 televisions? { .3974 }

3. Estimate the probability of getting at least 52 girls in 100 births. Assume that boys and girls are equally likely. [.3821]

4. Estimate the probability of passing a true/false test of 50 question if 60% (or 30 correct answers) is the minimum passing grade and all responses are random guesses. [.1020]

5. A firm establishes a committee to investigate the amount each contract costs over and above the amount quoted in the original contract (overruns). The committee has determined that the standard deviation of overruns is \$17,500.
 - (a) The average overrun for a random sample of 50 contracts is \$12,000. Determine a 98% confidence interval estimate of the true mean overrun based on this sample. { \$6233.54, \$17,766.45 }
 - (b) How large a sample should they use if they want to be 95% confident that the mean overrun is in error by no more than \$2000 { 295 }
 - (c) A random sample of 36 contracts is selected to estimate the average overrun. What is the probability that the sample mean will over-estimate the population mean overrun by at least \$5000 { .0436 }

6. The earnings per share for a random sample of technology stocks listed on the NYSE were (in \$'s):
1.90 2.15 2.01 0.89 1.53 1.89 2.12 2.05 1.75 2.22 3.44
 - (a) Assuming that earnings per share are normally distributed, determine a 95% confidence interval estimate of the average earnings per share of the NYSE technology stocks. { $\bar{x} = 1.9955$, $s = 0.608$ } { \$1.58, \$2.41 }
 - (b) A broker stated that the NYSE technical average earning was \$1.25 per share. Do the data confirm this or not. Use the results of (a) only
 - (c) How large a sample should be used if the estimate of the mean NYSE technology stock earnings is to be in error by no more than \$.10. You want to have a 97% level of confidence in your sample. { 175 }
 - (d) How can we decrease/increase the error? Assume that the variability does not change from the data given above.

7. A pilot study has revealed that the standard deviation of workers' monthly earnings in the chemical industry is \$180. How large a sample must be chosen to obtain an estimator of the mean salary that, with 90% confidence, will be correct to within \pm \$20? { 220 }

8. A random sample of 41 quarters has a mean weight of 5.622g and a standard deviation of 0.068g.
 - (a) Construct a 98% confidence interval estimate of the population mean of all quarters in circulation. [5.5963g, 5.6477]
 - (b) The U.S. Department of the Treasury claims that it mints quarters to yield a mean weight of 5.640g. Is this claim consistent with the confidence interval? Explain why.

9. Assume that we want to estimate the mean IQ scores for the population of professors. How many professors must be randomly selected for IQ test if we want 95% confidence that the sample means is within 2 IQ points of the population mean? Assume the standard deviation is 15. [217]

10. It is found that a sample size of 843 is necessary to estimate the mean weight (in grams) of sugar in packets supplied by Domino. That sample size is based on a 95% degree of confidence and a population standard deviation that is estimated by the sample standard deviation of 0.074g. Find the margin of error. [.005]

11. Maximum heart rates during automated snow removal: $n=10$, $\bar{x}=124$, $s=18$. Find the 95% confidence interval estimate of the population mean for those who use the electric snow thrower. [111,137]

12. The 95% confidence interval for the true mean distance by male students in one year is 11,290 to 12,466. This was based on a sample of 121 randomly selected male students. Find the sample standard deviation that was used. [$s=3266.6667$]

13. You have been hired by the Ford Motor Company to do market research, and you must estimate the percentage of household in which a vehicle is owned. How many households must you survey if you want to be 94% confident that your sample percentage has a margin of error of three percentage points?
 - (a) Assume that a previous study suggested that vehicles are owned in 86% of households. [473]
 - (b) Assume that there is no available information that can be used to estimate the percentage of households in which a vehicle is owned. [982]

14. Because a proposed survey is time-consuming, an enterprising pollster posts it on the Internet and promises free software to everyone who responds by completing the survey. Results include 2250 responses, and 80% of them indicate that a fax machine is owned. Construct a 95% confidence interval for the percentage of all people who have a fax machine. Are the results valid? Why or why not? [78.3%, 81.7%] Results are not valid because the sample is self-selected (not a random sample)

15. You plan to estimate the mean incubation period (in days) for sea birds. How many incubation periods of sea birds must you sample if you want to be 95% confident that the sample mean is within 3 days of the true population mean? Past experience suggest that these incubation periods typically range from 23 to 78 days. (81)

16. A random survey of 85 CEOs in British Columbia showed 70 respondents have a computer on their desk. Based on those results, construct a 98% confidence interval for the percentage of all CEOs in British Columbia who **do not** have a computer on their desk. (.0802, .2728)

17. The drug Ziac is used to treat hypertension. In a clinical test, 3.2% of 221 Ziac users experienced dizziness.
 - (a) Construct a 99% confidence interval estimate of the percentage of all Ziac users who experience dizziness. (.0015, .0625)
 - (b) In the same clinical test, people in the placebo group didn't take Ziac but 1.8% of them reported dizziness. Based on the results in parts (a) and (b), what can we conclude about dizziness as an adverse reaction to Ziac?