

## 21 - Final Review 2

### Problem 1.

- (a) Find probability of rolling a fair dice 7 times and getting exactly three "1"s.
- (b) Find the probability of randomly guessing exactly 4 correct answers on a test with 10 multiple choice questions, each question having A, B, C, D as answer options.
- (c) Let  $X$  be the random variable that records the number of correct answers that result when you randomly guess on each of a 100-question exam where each question answer is either True or False. Determine the expected value and standard deviation of  $X$ .
- (d) You roll a fair dice many times, and you only stop rolling once you get a non-"1" from a dice roll. Let  $X$  be the random variable that records the number of "1"s you get before you finally get a non-"1" dice roll. Determine the expected value and standard deviation of  $X$ .

**Problem 2.** Weights of a population of adult male penguins is normally distributed with a population mean of 30 lbs. and a population standard deviation of 2 lbs.

- (a) Find the probability that a randomly selected penguin from this population weighs less than 29 lbs.
- (b) Find the probability that the average weight of a random sample of 16 penguins from this population is less than 29 lbs.

**Problem 3.** How early or late an employee arrives to work at Rowan is normally distributed. A random sample of 4 employees finds that these employees are early or late to work with times  $-1$  minute (early),  $+1$  minute (late), and  $+3$  minutes (late).

- (a) Suppose that the population standard deviation is  $\sigma = 3$  minutes. Compute the 95% confidence interval for the population mean.
- (b) Suppose that the population standard deviation is unknown. Compute a 95% confidence interval for the population mean.

**Problem 4.** Sketch how to do each problem.

- (a) A manufacturer wants to estimate the mean radius of soccer balls within 0.1 cm. Determine the minimum sample size required to construct a 95% confidence interval for the population mean. Assume the population standard deviation is 0.5 cm.
- (b) In a survey of 600 UK teachers, 226 say they would wear a body camera in school. Construct 99% confidence interval for the population proportion.
- (c) A manufacturer claims that the average area that the smoke detector covers is at least 60 square meters. To test this claim, you randomly select a sample of 40 systems and find the mean coverage area to be 58 square meters. Assume the population standard deviation is 3.5 square meters. At  $\alpha = 0.10$ , do you have enough evidence to reject the manufacturer's claim?
- (d) When working, a chip-making machine produces at most 4% defective chips. A random sample of 200 chips produced from this machine contained 12 defective chips. Test the hypothesis that the machine is properly working at the significance level of 2.5%.

### Final tasks.

1. Decide office hour time to prepare for final exam (Sunday May 3, Monday May 4).
  2. Do student evaluations survey at <https://rowan.campuslabs.com/eval-home/>
  3. Do quiz.
- Final exam problems are similar to past exam problems, past homework problems, and past lesson sheet exercise problems.