

1. An average of 7 residents of the village of Westport (population 760) die each year. [poissonpdf(μ, x) or poissoncdf(μ, x)]
- Find the mean number of deaths per day. $\mu = .0192$
 - Find the probability that on any given day there are no deaths. .981
 - Find the probability that on a given day, there is one death. .0188
 - Find the probability that on a given day, there is more than one death. $1.820 \times 10^{-4} \approx 0.0002$
2. Neuroblastoma, a rare form of malignant tumor, occurs in 11 children in a million, so its probability is 0.000011. Four cases of neuroblastoma occurred in Oak Park, IL, which had 12,429 children. [Poisson]
- Assuming that neuroblastoma occurs as usual, find the mean number of cases in groups of 12,429 children. 0.137
 - Find the probability that the number of neuroblastoma cases in a group of 12,429 children is 0 or 1. 0.991
 - What is the probability of more than one case of neuroblastoma? 0.00854
 - Does the cluster of four cases appear to be attributable to random chance? Why or why not? No, the probability of more than 1 case is extremely small, so the probability of getting as many as 4 is even smaller.
3. For the standard normal distribution,
- Find the probability that z is less than -1.32
 - Find the probability that z is greater than 1.8.
 - Find the 70th percentile (P_{70}) (a) .0934 (b) .0359 (c) $z = .52$
4. Given a normal distribution with mean 15.8 and standard deviation of 1.7, Find
- $P(x = 10) = 0$
 - $P(x < 10) = .0003$
 - $P(x > 15.0) = .6808$
 - $P(5 < x < 20) = .9931$
5. Women's heights are normally distributed with mean 63.6 in. and standard deviation 2.5 in. The U.S. Army requires women's heights to be between 58 in. and 80 in.
- Find the percentage of women who meet this height requirement. 98.74%
 - Find the maximum height allowed so that all but the tallest 3% would be able to join the army. 68.3 in.
6. The incubation time for Allen hummingbird eggs are (approximately) normally distributed with a mean of 16 days and a standard deviation of 2 days. Suppose we have a random sample of 30 hummingbird eggs in an incubator. Find the probability that
- A single egg will have an incubation time greater than 15 days. $P(x > 15) = 0.6915$
 - The random sample of 30 will have a mean incubation time greater than 15 days. $P(\bar{x} > 15) = 0.9969$
 - The random sample will have a mean incubation time between 16 and 17 days. $P(16 < \bar{x} < 17) = .4969$
7. After the Bigtown Fugitive Task Force displays photos of 99 fugitives in the local newspaper, the police arrest 17 of them.
- Construct an 85% confidence interval estimate of the proportion of fugitives arrested after their photo was displayed. $.12 < p < .23$
 - Based on your confidence interval, what can you say about the Task Force's claim that the method of displaying photos results in arresting a quarter of the fugitives. Since .25 is not in the CI, this claim is not justified.

8. As the newly hired manager of a company that provides cell phone service, you want to determine how many the percentage of adults in your state who live in a household with cell phones and no land-line phones. How many adults must you survey? Assume that you want to be 90% confident that the sample percentage is within 4 percentage points of the true population percentage.

- (a). Assume that nothing is known about the percentage of adults who live in a household with cell phones and no land-line phones. 423
- (b). Assume that a recent survey suggests that about 8% of adults live in a household with cell phones and no land-line phones. 125

9. A random sample of 12 East Coast colleges and universities gave the following percentage tuition increases for a given 2-year period. Compute a 90% confidence interval for the population mean percentage tuition increase μ . Assume that the population is approximately normally distributed. $3.67% < \mu < 5.73%$

3.9 2.3 3.7 9.4 4.8 3.9 6.7 6.6 4.6 4.3 3.1 3.1

10. Nielsen Media Research wants to estimate the mean amount of time (in minutes) that full-time college students spend watching tv each weekday. A pilot study showed that the standard deviation is 112.2 minutes. Find the sample size necessary to estimate that mean with a 15-minute margin of error. Assume that a 96% confidence level is desired. 236

11. Use the following information to construct a confidence interval estimate for the standard deviation σ : 95% confidence, $n = 16$, $\bar{x} = 16$, $s = 1.56$ $1.15 < \sigma < 2.41$

12. For the given claim, express the null hypothesis and alternative hypothesis in symbolic form. Be sure to use the correct symbol (p, μ, σ) for the indicated parameter.

The majority of college students have a laptop.

$$H_0 : p = 0.50; H_1 : p > 0.50$$

13. Assume that the normal distribution applies and find the critical z value(s) for $\alpha = 0.01$ and $H_1 : p < 0.36$.

$$z_{crit} = -2.33$$

14. The claim is that more than 64% of households in the United States have more than one car. A survey of 1023 households found that 604 have more than one car. Find the test statistic for the population proportion. $z = -3.30$

15. If the test statistic in a two-tailed test is $z = 1.81$

- (a). Find the P -value. $P\text{-value} = 0.0702$
- (b). Using a significance level of $\alpha = 0.05$ determine whether you would reject the null hypothesis or fail to reject the null hypothesis. Fail to reject H_0 .

16. Suppose you want to open your own music store. You learn from research that the mean start-up costs (across the entire country) for such a business is \$61,400. You are planning to open your store in Idaho and would like to compare the costs. You randomly select 34 music stores in Idaho and find that this sample has a mean start-up cost of \$55,200 and standard deviation of \$18,800. Use a 0.05 significance level to determine whether population mean start-up costs in Idaho are lower than the national average. Use the traditional method and the P -value method. $H_0 : \mu = 61,400; H_1 : \mu < 61,400;$

Test statistic: $t = -1.923$; Critical value: $t = -1.692$. $P\text{-value} = .0274$. Reject H_0 . There is sufficient evidence to support the claim that the mean start-up costs in Idaho are lower than the national average.

17. (Assume that the sample is from a normally distributed population.) The times (in minutes) listed below are waiting times for customers at a bank where everyone waits in a single line that feeds three teller windows. Previously the bank had three waiting lines, one for each teller window. With the three waiting lines, the standard deviation of waiting times was 1.9 minutes. Use a significance level of 0.10 to test the claim that the single-waiting line has a smaller standard deviation. Does the single waiting line appear to reduce the variation in waiting times?

6.5 6.6 6.7 6.8 7.1 7.3 7.4 7.7 7.7 7.7

$H_0 : \sigma = 1.9$; $H_1 : \sigma < 1.9$; Test statistic: $\chi^2 = 0.566$; Critical Value: $\chi_{crit}^2 = 4.168$. Reject H_0 . There is sufficient evidence to support the claim that the standard deviation is less than 1.9 minutes. Yes, the single line does appear to reduce variation.

18. A few years ago some professional baseball players complained that umpires were calling more strikes than the average rate of 61.0% called the previous year. A report showed that one umpire had called strikes in 2231 of 3581 pitches (based on data from USA Today). Use a 0.05 significance level to test the claim that this umpire has a strike rate greater than 61%. Use the P -value method.

$H_0 : p = 0.61$; $H_1 : p > 0.61$; Test statistic: $z = 1.60$; P -value: 0.0548. Fail to reject H_0 . There is not sufficient evidence to support the claim that the strike rate is greater than 61%.

19. Test the following claim using a significance level of $\alpha = 0.10$ and your choice of method. A newspaper reports that “3/4 of all adults use the Internet.” A Pew Research Poll found that 73% of 3011 adults said that they did use the internet. Explain whether it is okay for the newspaper to make the claim above.

$H_0 : p = 0.75$; $H_1 : p \neq 0.75$; Test statistic: $z = -2.53$; $z_{crit} = -1.645$ and 1.645 ; or P -value = .011; Reject H_0 . There is sufficient evidence to warrant rejection of the claim that 3/4 of all adults use the Internet. Since there is evidence to warrant rejection of this claim, the newspaper should not print it.

20. Section 9.1, p. 424 #9. Use both the Critical Value Method and the P -Value Method