Unit 3 Practice Worksheet

1 Standard Normal Distribution

mean = 0
s.d = 1

a) Find the probability that $z \leq -1.8$.

normcdf(-e99, -1.8, 0, 1) = 0.0359

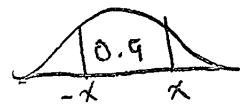
b) Find z_0 such that $P(z > z_0) = 0.15$.

invnorm(0.85, 0, 1) = 1.04

c) Find the two critical z-values that enclose the middle 90% of the standard normal distribution.

critical value (is a z-score)

invnorm(0.9, 0, 1) = ±1.645



2 Real-World Normal Distribution

The average height of adult men is 70 inches with a standard deviation of 3 inches.

a) What is the probability that a randomly selected man is taller than 74 inches?

$p(x > 74) = 0.0912$

normcdf(74, e99, 70, 3) = 0.0912

b) What height corresponds to the 10th percentile?

$p(x < X) = 10$ $\quad X = 66.15$

invnorm(0.1, 70, 3)

3 Confidence Intervals for the Mean

A random sample of 25 students had a mean study time of 12.5 hours per week with a standard deviation of 3.2 hours.

a) Construct a 95% confidence interval for the mean weekly study time.

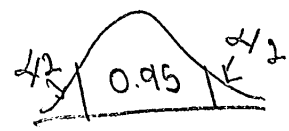
$\bar{x} \pm t_{\alpha/2} \cdot \frac{s}{\sqrt{n}}$

CL = 0.95
$\alpha = 0.05$
$\alpha/2 = 0.025$
$n = 25$
$df = 24$

$12.5 \pm 2.064 \cdot \frac{3.2}{\sqrt{12.5}}$

12.5 ± 1.32
$12.5 - 1.32 = 11.18$
$12.5 + 1.32 = 13.82$

(10.63, 14.37)



b) Interpret the interval in context.

We are 95% confident that the true mean study time of all students lies between 11.2 and 13.8 hours per week.

4 Determining Confidence Level

If $z_a/_2 = 2.33$, what is the corresponding confidence level (in %)?

normcdf(-2.33, 2.33, 0, 1) = 0.98 or 98%

5 Confidence Interval Interpretation

A 90% confidence interval for the average commute time of college students is (21.4, 28.6) minutes.

a) Write this interval as: point estimate ± margin of error.

$PE = \frac{21.4 + 28.6}{2} = 25$

$MOE = 28.6 - 25 = 3.6$

25 ± 3.6

b) If a researcher claims that the average commute time is 30 minutes, what can we conclude?

30 is outside of interval (21.4, 28.6)

☐ Claim is valid ☑ Claim is invalid ☐ Insufficient information

6 Estimating Sample Size

A university wants to estimate the average cost of dorm meals within ±$50 at a 95% confidence level. Assume the population standard deviation is $180. Find the minimum sample size required.

ALWAYS ROUND UP! (next whole #)

$\alpha = 0.05$

$\alpha/2 = 0.025$

$n = \left(\frac{1.96 \cdot 180}{50}\right)^2 = 49.78$

50

7 Confidence Interval for Proportions

In a sample of 200 college students, 110 said they use public transportation weekly.

a) Construct a 95% confidence interval for the true proportion of students who use public transportation weekly.

formula $\hat{p} \pm z\sqrt{\frac{p \cdot q}{n}}$

$\hat{p} = \frac{110}{200} = 0.55$

$\alpha = 0.05$

$\alpha/2 = 0.025$

invnorm(0.025, 0, 1) = 1.96

$q = 1 - 0.55 = 0.45$

$0.55 \pm 1.96\sqrt{\frac{0.55 \cdot 0.45}{200}}$

0.55 ± 0.09

$0.55 - 0.09 = 0.48$

$0.55 + 0.09 = 0.62$

(0.48, 0.62)