Confidence Intervals for Means

Name: KEY Section Number: _____

Background

This workbook is focused primarily on sample and population proportions. However, one can also compute confidence intervals for a population mean μ, based on a sample mean $\bar{x}$. The formula for this computation is below:

$$\bar{x} \pm z^* \frac{s}{\sqrt{n}}$$

In this formula s is the standard deviation of the sample data, n is the sample size, and z* is the confidence coefficient you first encountered when learning about proportions. While this is not the exact mathematical formula, it will be fine for our purposes. Your instructor may or may not choose to clarify the differences between t- and z-distributions at this point. The interpretation associated with this interval is just the same as it is for proportions, with the obvious change to "mean" language.

for additional practice, # attached list & use a random # table to choose your own list of 10 random presidents.

EXHIBIT 1

Inaugural Intervals

A random sample of 10 U.S. Presidents was taken and the age at inauguration recorded. See the table on the right.

TABLE 2.9 Inaugural Intervals

President	Age at Inauguration
James Madison	57 years, 353 days
Martin Van Buren	54 years, 89 days
Millard Fillmore	50 years, 183 days
Warren G. Harding	55 years, 122 days
William McKinley	54 years, 34 days
William Howard Taft	51 years, 170 days
George Washington	57 years, 67 days
Benjamin Harrison	55 years, 196 days
Franklin D. Roosevelt	51 years, 33 days
Ulysses S. Grant	46 years, 311 days

Questions Put data in L1 convert days to years by ÷ by 365

1. Find the sample mean of these 10 Presidents' ages in days, at the time of their inauguration.

1-Var Stats

$\bar{x} = 53.43$

take decimal part & x by 365 ⇒ .426849 x 365 = 155.8

53 years 156 days

2. Find the sample standard deviation of these ten Presidents' ages in days.

$S_x = 3.41598$

$.41598263 2 \times 365 = 151.8 \approx$ 3 years 152 days or 1247 days

3. What is z* for a 90% confidence interval?

invNorm (.05) = ± 1.64485

4. Compute a 90% confidence interval for the true average age (in days) of all U.S. Presidents, up to and including President Obama, at the time of inauguration.

by ZInterval : Stats

$\sigma = 3.41598$
$\bar{x} = 53.43$
$n = 10$
C-level : .90

(51.653, 55.207)

5. Carefully interpret the interval you computed in Question 4.

we are 90% sure that the true mean age of Presidents at inauguration is between 51.653 years and 55.207 years or 51 years 238 days and 55 years, 76 days

6. Do some research on your own and determine the true average age of *all* 44 U.S. Presidents, up to and including President Obama.

See if the interval you computed in Question 4 contains this true average. Whether it does or doesn't, explain the chances of that outcome happening.

attached list

1 Var Stats

$\bar{x} = 55.16096$
$S_x = 6.2775$

it is inside the interval
There was a 90% chance of that happening.

Stat 1350, Ages of Presidents at Inauguration, Spring 2015

George Washington	57 years, 67 days or 57.18356 years
John Adams	61 years, 125 days or 61.3425 years
Thomas Jefferson	57 years, 325 days or 57.8904 years
James Madison	57 years, 353 days or 58.9671 years
James Monroe	58 years, 310 days or 58.8493 years
John Quincy Adams	57 years, 236 days or 57.6466 years
Andrew Jackson	61 years, 354 days or 61.9699 years
Martin Van Buren	54 year, 89 days or 54.2438 years
William Henry Harrison	68 years, 23 days or 68.0630 years
John Tyler	51 years, 6 days or 51.0164 years
James K. Polk	49 years, 122 days or 49.33 42 years
Zachary Taylor	64 years, 100 days or 64.2740 years
Millard Fillmore	50 years, 183 days or 50.5014 years
Franklin Pierce	48 years, 101 days or 48.2767 years
James Buchanan	65 years, 315 days or 65.8630 years
Abraham Lincoln	52 years, 20 days or 52.0548 years
Andrew Johnson	56 years, 107 days or 56.2932 years
Ulysses S. Grant	46 years, 311 days or 46.8521 years
Rutherford B. Hayes	54 years, 151 days or 54.4137 years
James A. Garfield	49 years, 105 days or 49.2877 years
Chester A. Arthur	51 years, 349 days or 51.9562 years
Grover Cleveland	47 years, 351 days or 47.9616 years
Benjamin Harrison	55 years, 196 days or 55.5370 years
Grover Cleveland	55 years, 351 days or 55.9562 years
William McKinley	54 years, 34 days or 54.0932 years
Theodore Roosevelt	42 years, 322 days or 42.8822 years
William Howard Taft	51 years, 170 days or 51.4658 years
Woodrow Wilson	56 years, 66 days or 56.1808 years
Warren G. Harding	55 years, 122 days or 55.3342 years
Calvin Coolidge	51 years, 29 days or 51.0795 years
Herbert Hoover	54 years, 206 days or 54.5644 years
Franklin D. Roosevelt	51 years, 33 days or 51.0904 years
Harry S. Truman	60 years, 339 days or 60.9288 years
Dwight D. Eisenhower	62 years, 98 days or 62.2685 years
John F. Kennedy	43 years, 236 days or 43.6466 years
Lyndon B. Johnson	55 years, 87 days or 55.2384 years
Richard Nixon	56 years, 11 days or 56.0301 years
Gerald Ford	61 years, 26 days or 61.0712 years
Jimmy Carter	52 years, 111 days or 52.3041 years
Ronald Reagan	69 years, 349 days or 69.9479 years
George H. W. Bush	64 years, 222 days or 64.6082 years
Bill Clinton	46 years, 154 days or 46.4219 years
George W. Bush	54 years, 198 days or 54.5425 years
Barack Obama	47 years, 169 days or 47.4630 years