

Table of the ages of the 42 presidents at inauguration.

President	Age	President	Age	President	Age	President	Age
Washington	57	Taylor	64	Cleveland	47	Eisenhower	61
J. Adams	61	Fillmore	50	B. Harrison	55	Kennedy	43
Jefferson	57	Pierce	48	Cleveland	55	L.B. Johnson	55
Madison	57	Buchanan	65	McKinley	54	Nixon	56
Monroe	58	Lincoln	52	T. Roosevelt	42	Ford	61
J. Q. Adams	57	A. Johnson	56	Taft	51	Carter	52
Jackson	61	Grant	46	Wilson	56	Reagan	69
Van Buren	54	Hayes	54	Harding	55	Bush	64
W. H. Harrison	68	Garfield	49	Hoover	54	Clinton	46
Tyler	51	Arthur	51	F. D. Roosevelt	51		
Polk	49	Coolidge	51	Truman	60		

Problem 1: (30 points)

- (a) Display the presidential ages at inauguration in a stem-and-leaf plot.
- (b) Find the median, lower quartile, and upper quartile of presidential ages at inauguration.
- (c) Graph the distribution of ages with a box-and-whisker plot. Does the plot exhibit strong skewness, or is it fairly symmetric?
- (d) Find the mean and standard deviation of the ages of the first eight presidents (Washington through Van Buren). You may use your calculator and not show work.
- (e) The mean age of inauguration of all 42 presidents is 54.8 years, and the standard deviation is 6.4 years. How many presidential inauguration ages are within one standard deviation of the mean?

Problem 2: (20 points)

A 1792 law stated that the gold \$10 eagle coin should contain 247.5 grains of pure gold. Because of imperfections in the manufacturing process, the actual weight of pure gold in each coin varies. Assume that the distribution of coin weights is approximately normal with a mean of 247.50 grains and a standard deviation of 0.08 grains.

- (a) What percentage of gold eagle coins contain more than 247.75 grains of gold?
- (b) In 1837, Congress passed a law that stated that officers of the Mint “shall be deemed disqualified to hold their positions” if a single coin deviated from 247.5 by more than 0.25 grains (was smaller than 247.25 or larger than 247.75). What proportion of coins have weights that deviate by more than 0.25 grains from the mean of 247.50?
- (c) The lightest 2% of coins will all have less than how many grains of gold?
- (d) The middle 75% of coins will have grains of gold between which two values?

Problem 3: (20 points)

Age	17.2	43.5	30.7	53.1	37.2	21.0	27.6	46.3
Blood Alcohol Concentration	0.19	0.20	0.26	0.16	0.24	0.20	0.18	0.23

The table above gives the age and blood alcohol concentration (BAC) of eight individuals convicted for driving while intoxicated. BAC measurements are a percentage of alcohol in the blood.

- (a) Plot the data in a scatterplot you could use to predict BAC based on age.
- (b) Do age and BAC have a strong positive association, a strong negative association, or a weak association? Justify your response by referring to what you see in your scatterplot.
- (c) Use your calculator to find the mean and standard deviation of the ages of the eight individuals.
- (d) BAC has a mean and standard deviation of 0.2075 and 0.0333 percent respectively. The correlation coefficient between age and BAC is -0.06916 . Find the regression equation to predict BAC in the form below.

$$(\text{predicted BAC}) = a + b(\text{age in years})$$

- (e) Use your regression equation to predict the BAC of a sixteen-year-old arrested for driving while intoxicated in the same county. Is this a reasonable prediction? Explain.

Circle **True** or **False** for Problems 4 through 18. If you answer **False**, explain why. Each problem is worth two points.

Problem 4:

True or False:

For strongly left skewed data, the mean will be larger than the median.

Problem 5:

True or False:

For any normal curve, about 68% of all observations are within two standard deviations of the mean.

Problem 6:

True or False:

The z -score of an observation is interpreted as the number of standard deviations the observation is from the mean.

Problem 7:

True or False:

A physics student conducts an experiment by dropping a small hard ball from several different heights (x) and measuring the time (y) it takes for the ball to hit the ground. The correlation coefficient for the data is $r = 0.985$. Because this correlation coefficient is so close to 1, this implies that height and time have a strong linear relationship and that a nonlinear relationship would not give a better fit.

Problem 8:

True or False:

If a correlation coefficient is exactly 1, this means the data lie exactly on a line with slope one.

Problem 9:

True or False:

A correlation coefficient of -2.10 indicates that two variables are strongly negatively associated.

Problem 10:

True or False:

A residual plot from a regression of y on x shows a pattern where the residuals are positive for small x , negative for middle x and positive again for large x . This indicates that x and y have a nonlinear relationship.

Problem 11:

True or False:

When two variables are positively associated, this shows there is a causal relationship between the variables.

Problem 12:

True or False:

In a regression problem, points with x values close to \bar{x} are usually influential points.