1. Put the measurements in list \( L_1 \) and the frequencies in list \( L_2 \). Then execute the command \( 1\text{-Var Stats } L_1,L_2 \).

(a) Assuming this group is the entire population under consideration:

(i) \( \mu = 21.4 \text{ hrs} \) and \( \sigma \approx 6.805 \text{ hrs} \)

(ii) There are 110 measurements, so the median is given by the average of the 55th and 56th measurements which are 20 and 25. Thus, the median is \( (20 + 25)/2 = 22.5 \). The mode is 25 hrs because this value occurs most often at 30 times.

(iii) \( \mu \pm \sigma = 21.4 \pm 6.805 \), which is 14.595 to 28.205. This range contains students whose hours are 18, 20, 25, 27. There are \( (12 + 21 + 30 + 16) = 79 \) out of 110, or 71.82%.

(b) Assuming this group is only a random sample from a larger population, then

(i) \( \bar{x} = 21.4 \) and (ii) \( s \approx 6.836 \).

(iii) The sample could represent all WKU students with a major in the Journalism College.

(iv) \( Q_1 = 18 \) is the median of the measurements below the median of 22.5.

\( Q_3 = 25 \) is the median of the measurements above the median of 22.5.

(v) \( Q_1 - 1.5(Q_3 - Q_1) \) to \( Q_3 + 1.5(Q_3 - Q_1) \) is \( 18 - 1.5 \times 7 \) to \( 25 + 1.5 \times 7 \), or 7.5 to 35.5.

The outliers are the measurements \textit{outside} of this range, which is only 40 hrs.

(vi) Histogram bins: [5, 10) has 2, [10, 15) has 20, [15, 20) has 12, [20, 25) has 21, [25, 30) has 46, [30, 35) has 6, and [40, 45) has 3 measurements.

2. (a) \( \Omega = \text{Boxes of Cheer detergent; } X = \text{content weight in oz.} \)

Then \( X \sim N(42, 0.80) \text{oz.} \)

(b) (i) \( P(X \leq 43) \approx 0.89435, \text{ or 89.435}\% \)

Use \texttt{normalcdf(‘1E99, 43, 42, .8)}
(ii) \( P(X \geq 42.6) \approx 0.2266 \), or 22.66%

Use normalcdf(42.6, 1E99, 42, .8)

(iii) \( P(40.64 \leq X \leq 43.24) \approx 89.5% \)

Use normalcdf(40.64, 43.24, 42, .8)

(c) 25% must be below \( x \); so \( x \approx 41.46 \text{ oz.} \)
from the invNorm(.25, 42, .8) command.

(d) 20% must be at each tail. The bounds are about 41.3267 oz. and 42.6733 oz.

(e) For each, use \( \mu \pm z_{\alpha/2} \sigma \) with the proper \( z \)-score:

(i) \( 42 \pm (1.645 \times 0.80) = 42 \pm 1.316 \text{ oz.}, \) or 40.684 oz. to 43.316 oz.

(ii) \( 42 \pm (1.96 \times 0.80) = 42 \pm 1.568 \text{ oz.}, \) or 40.432 oz. to 43.568 oz.

(iii) \( 42 \pm (2.326 \times 0.80) \approx 42 \pm 1.861 \text{ oz.}, \) or 40.139 oz. 43.861 oz.

3. (a) \( \bar{x} \sim N\left(\mu, \sigma \sqrt{n}\right) = N\left(42, \frac{0.8}{\sqrt{25}}\right) = N(42, 0.16) \text{ oz.} \) (Normally distributed with mean 42 oz. and standard deviation 0.16 oz.)

(b) \( P(41.9 \leq \bar{x} \leq 42.1) \approx 0.468 \)

(c) \( 42 \pm (2.576 \times 0.16) \text{ oz.} \)

or from about

41.58784 oz. to 42.41216 oz.

So 46.8% of \( \bar{x} \) are from 41.9 to 42.1 oz.

4. For \( X \sim N(100, 12) \), the score \( X = 85 \) becomes \( \frac{85 - 100}{12} = -1.25 \).

For \( Y \sim N(200, 20) \), the score \( Y = 224 \) becomes \( \frac{224 - 200}{20} = 1.2 \).

So \( X = 85 \) is more extreme because it is further away from 0 on a standard scale.

5. (a) \( 60 \ \text{nCr} \ 16 \approx 1.496 \times 10^{14} \text{ ways} \) \hspace{1cm} (b) \( \mu_{\bar{x}} = \mu = 21.8 \).

(c) Here \( N = 60 \) and \( n = 16 \). So \( \sigma_{\bar{x}} = \sigma \sqrt{\frac{N-n}{N-n}} = \frac{3.4}{\sqrt{16}} \sqrt{59} \approx 0.734 \)

(d) \( \sigma_{\bar{x}} = \frac{3.4}{\sqrt{16}} = 0.85 \)