1. A random sample of 400 hospital admissions from a week's total of 5400 finds 88 were emergency contacts. Give a 98% confidence interval for $p =$ rate of emergency contacts among admissions.

\[
\hat{p} = \frac{88}{400} = \frac{22}{100} = 0.22
\]

\[
\hat{p} \pm z \frac{\sqrt{\hat{p}(1-\hat{p})}}{\sqrt{n}} \approx 1
\]

\[
\frac{\sqrt{400} - 900}{5400 - 1}
\]

\[
\frac{\sqrt{22.78}}{400}
\]

\[
\frac{0.22 \pm 2.326}{\sqrt{400}}
\]

\[
0.22 \pm 2.326 \frac{0.22 \pm 0.02}{400}
\]
2. A random sample of 36 elk selected from the Jackson, Wy. Elk Refuge in winter are scored for $x =$ lead exposure finding sample mean $\bar{x} = 27.6$

sample standard deviation $s = 11.4$

It is believed that $x$ scores in this winter herd are normal distributed. Give the 80% confidence interval for population mean lead exposure $\mu$.

$$\bar{x} \pm t \frac{s}{\sqrt{n}}$$ (1)

$35 = n-1 = 36-1$

$\bar{x} \pm t \frac{11.4}{\sqrt{36}}$

$27.6 \pm 1.306 \frac{11.4}{\sqrt{36}}$

ESTO OF SD OF LIST OF ALL $\bar{x}$

ESTO OF MARGIN OF ERROR OF $\bar{x}$
3. What does estimated margin of error of $\bar{x}$ actually estimate?

- Population sd $\sigma$
- $sd$ of the list of all possible $\bar{x}$
- $1.96 \sigma$
- $1.96 \times sd$ of the list of all possible $\bar{x}$

Est of $sd$ of list of all possible $\bar{x}$

For $\text{E.M.O.E}$
4. We have obtained **estimated standard errors** for rates of cracking of concrete:

- 0.037 for \( \hat{p}_{\text{mixes with latex}} \)
- 0.042 for \( \hat{p}_{\text{mixes without latex}} \)

**Give the estimated margin of error** for \( \hat{p}_{\text{latex}} - \hat{p}_{\text{no latex}} \):

\[
1.96 \sqrt{0.037^2 - 0.042^2}
\]

\( \text{MOE} \)

**Estimated standard error of \( \hat{p}_{\text{latex}} \):**

\[
\sqrt{\hat{p}_{\text{latex}} \left( 1 - \hat{p}_{\text{latex}} \right)} = 0.037
\]

**Also:**

**Estimated standard error of \( \hat{p}_L - \hat{p}_{NL} \):

\[
\sqrt{\frac{\hat{p}_L \left( 1 - \hat{p}_L \right) + \hat{p}_{NL} \left( 1 - \hat{p}_{NL} \right)}{n_L + n_{NL}}}
\]

Root of sum of squares

**Then for estimated MOE of \( \hat{p}_L - \hat{p}_{NL} \) tack on 1.96.**
5. We have obtained estimated standard errors for sample means of concrete hardness

\[ 0.037 \text{ for } \bar{x}_{\text{mixes with latex}} \]
\[ 0.042 \text{ for } \bar{x}_{\text{mixes without latex}} \]

Give the estimated margin of error for

\[ \bar{x}_{\text{latex}} - \bar{x}_{\text{no latex}} \]

\[ 1.96 \sqrt{0.037^2 + 0.042^2} \]

\[ \bar{x}_L \text{ ESTD OF HARDNESS} \]
\[ \bar{x}_{NL} \]

\[ \text{ESTD STD ERROR OF } \bar{x}_L - \bar{x}_{NL} \text{ IS } \sqrt{0.037^2 + 0.042^2} \]
6. Estimate the mean and sd by eye.

Mean is at 100

Appears $\text{SD} = 120 - 100$ so $\text{SD} = 20$
7. Amount of genetic material in a given plot is normal distributed with

\[ \mu = 9 \quad \sigma = 3 \]

Determine the standard score \( z \) of a plot with score \( x = 10.5 \).

\[ z = \frac{x - \mu}{\sigma} = \frac{10.5 - 9}{3} = \frac{1.5}{3} = .5 \]

Determine the amount \( x \) of genetic material of a plot with standard score \( z = 2.5 \).

Plot \#1 \( z = 2.5 \) = \( \frac{x - 9}{3} \)

Solve \( x = \mu + z \sigma = 9 + 2.5 \times 3 = 16.5 \)
8. What is the **exact chance** that a 95% confidence interval for \( \mu \) will in fact cover \( \mu \) if the population is normal distributed and the t-CI is used?

\[ 0.95 \]
9. Use the z-table to determine \( P(Z < 2.43) \).

\[
\begin{array}{c|c}
 z & 0.03 \\
\hline
 2.4 & 0.9925 \\
\end{array}
\]

\[\text{Ans} \quad P(Z < 2.43) = 0.9925\]
10. Determine the 86th percentile of Z.

\[ z = 1.08 \]

IQ is normal distributed and has mean 100 and sd 15. Determine the 86th percentile of IQ.

\[ IQ = 100 + z \times 15 = 100 + 1.08 \times 15 \]

Now 86th percentile of IQ
11. Determine the 86th percentile of Z. Calculate the sample standard deviation $s_x$ for the list $x = \{0, 0, 4, 8\}$.

$$\text{avg} = \frac{12}{4} = 3$$

$$s_x = \sqrt{\frac{(0-3)^2+(0-3)^2+(4-3)^2+(8-3)^2}{4-1}} = 3.82971$$

$$s_{4.000} = |4| \cdot s_x = 4 \cdot (3.82971)$$

Does Not Change
12. We've selected random samples of people with or without medication, the score being \( x \) = blood pressure decrease over a 5 minute period. Assume large populations.

\[
\begin{align*}
\bar{x}_{\text{with med}} &= 12.3 & s_{\text{with med}} &= 3.2 & n &= 60 \\
\bar{x}_{\text{without med}} &= 3.7 & s_{\text{with med}} &= 1.2 & n &= 90
\end{align*}
\]

Give the 95% CI for \( \mu_{\text{with med}} - \mu_{\text{without med}} \).

\[
(12.3 - 3.7) \pm 1.96 \sqrt{\frac{3.2^2}{60} + \frac{1.2^2}{90}}
\]