This time: measurement error; prob. models for means
Next time: statistical models for means; interval estimation
Read: DD (B) ch.11   LN: pp. L-127-156   This time: LN pp. L-127

3.9 is more useful than # is > 3.5

weighing butter:
\[
\begin{bmatrix}
16 \text{ oz} \\
16 \text{ oz} \\
16 \text{ oz} \\
\vdots
\end{bmatrix}
\quad \begin{bmatrix}
16.0 \\
16.0 \\
16.0 \\
\vdots
\end{bmatrix}
\quad \begin{bmatrix}
16.01 \\
15.98 \\
15.99 \\
\vdots
\end{bmatrix}
\]
\[
\text{(deterministic)} \quad \text{(probabilistic)}
\text{(same value everytime)} \quad \text{(stochastic)} \quad \text{(different value every time)}
\]

Basic Model
\[
(\text{obs. } 1) = \theta + \text{(bias)} + \text{(random error)} \quad \text{mean } 0 \quad \text{IID}
\]
\[
(\text{obs. } 2) = \text{(true value)} + \text{(bias)} + \text{(random error)}
\]

chart on other page

\[
P(\text{misclassification}) = P(y > 3.5)
\]

\[
\frac{3.5 - 3.8}{0.2} = -1.50 \quad \text{check L-34/35}
\]
Would you pay $25 for a 7% chance to eat more bananas than you needed to?
**expected value of \( \bar{y} \)
= EV of \( \bar{y} \)
= \( E(\bar{y}) \)
= \( E_{\text{IID}}(\bar{y}) \) = ?

**math fact:** \( E_{\text{IID}}(\bar{y}) = \mu \)

**long run SD of \( \bar{y} \) = standard error of \( \bar{y} \)
= SE of \( \bar{y} \) = SE(\( \bar{y} \)) = SE_{\text{IID}}(\( \bar{y} \)) = ?

**math fact:** \( SE_{\text{IID}}(\bar{y}) = \frac{\sigma}{\sqrt{n}} \)

**Square root law:** to cut the SE in half, you have to quadruple the Sample Size.

here \( SE(\bar{y}) = \frac{0.2}{\sqrt{4}} = 0.1 \)