One-Sided Confidence Interval

**Size of Interval**

\[
\begin{align*}
\mu - 1.96 \sigma_{\bar{x}} & \quad \text{Lower bound} \\
\mu & \quad \text{True value} \\
\mu + 1.96 \sigma_{\bar{x}} & \quad \text{Upper bound}
\end{align*}
\]

\[95\% \text{ Samples}]

**Two-Sided C. I.**

\[
\begin{align*}
Z \text{ C. I.:} & \quad (\bar{X} - Z_{\alpha/2} \cdot \frac{s}{\sqrt{n}}, \bar{X} + Z_{\alpha/2} \cdot \frac{s}{\sqrt{n}}) \\
t \text{ C. I.:} & \quad (\bar{X} - t_{\alpha/2} \cdot \frac{s}{\sqrt{n}}, \bar{X} + t_{\alpha/2} \cdot \frac{s}{\sqrt{n}})
\end{align*}
\]

**One-Sided C. I.**

\[
\begin{align*}
Z \text{ C. I.:} & \quad \begin{cases} 
(\bar{X}, \infty) & \text{Upper interval} \\
(-\infty, \bar{X} + Z_{\alpha} \cdot \frac{s}{\sqrt{n}}) & \text{Lower interval}
\end{cases} \\
t \text{ C. I.:} & \quad \begin{cases} 
(\bar{X} + t_{\alpha} \cdot \frac{s}{\sqrt{n}}, \infty) & \text{Upper interval} \\
(-\infty, \bar{X} - t_{\alpha} \cdot \frac{s}{\sqrt{n}}) & \text{Lower interval}
\end{cases}
\end{align*}
\]

**Lower Interval**

\[
\begin{align*}
\mu - 1.64 \sigma_{\bar{x}} & \quad \text{Lower bound} \\
\mu & \quad \text{True value} \\
\mu + 1.64 \sigma_{\bar{x}} & \quad \text{Upper bound}
\end{align*}
\]

\[95\% \text{ Samples}]

\[z_{\alpha} = z_{0.05}\]

**Estimation Example Mean \((n > 30)\)**

The mean of a random sample of \(n = 100\) is \(\bar{x} = 50\), with \(s = 10\). Set up an upper 95\% confidence interval estimate for \(\mu\).

\[
1 - \alpha = .95, \quad \alpha = .05, \quad z_{\alpha} = 1.64.
\]

\[
\begin{align*}
(\bar{X} - Z_{\alpha} \cdot \frac{s}{\sqrt{n}}, \infty) & \\
(50 - 1.64 \cdot \frac{10}{\sqrt{100}}, \infty) & \\
(48.36, \infty)
\end{align*}
\]