8.44. Independent samples of \( n_1 = 500 \) and \( n_2 = 500 \) observations were selected from binomial populations 1 and 2, and \( x_1 = 120 \) and \( x_2 = 147 \) successes were observed.

(a) Estimate the difference \( p_1 - p_2 \) between the two population proportions.

\[
\hat{p}_1 - \hat{p}_2 = 0.24 \quad 9
\]

(b) Estimate the standard error for the estimate.

\[
\text{SE} = 0.03 \quad 10
\]

(c) What is the margin of error for the estimate in (a)?

\[
\text{ME} = 0.06 \quad 10
\]

(d) The sample from the second population had a higher percentage of successes. Is this difference significant at the 95% confidence level? Explain why or why not?

8.46. Independent samples of \( n_1 = 1265 \) and \( n_2 = 1688 \) observations were selected from binomial populations 1 and 2, and \( x_1 = 849 \) and \( x_2 = 910 \) successes were observed.

(a) Find the 99% confidence interval for the difference \( p_1 - p_2 \) between the two population proportions.

\[
\left( \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\frac{\hat{p}(1-\hat{p})}{n_1} + \frac{\hat{p}(1-\hat{p})}{n_2}}} \right) = [\_ \_ \_ \_, \_ \_ \_ \_] \quad 14, 9
\]

(b) The sample from the second population had a higher percentage of successes. Is this difference significant at the 99% confidence level?

8.50. A sampling of political candidates — 200 from the West and 200 from the East — showed that 120 in the West had union backing while 142 in the East had union backing.

(a) Find the 95% confidence interval for the difference between the proportion of union backed candidates in the West and in the East.

\[
\left( \hat{p}_1 - \hat{p}_2 \right) = [\_ \_ \_ \_, \_ \_ \_ \_] \quad 2, 8
\]

(b) The sample from the East had a higher percentage of union backing. Is this difference significant at the 95% confidence level? Explain why or why not?

8.54(2) Find a 99% lower bound confidence interval for the proportion \( p \) when a random sample of \( n = 400 \) trials produced \( x = 196 \) successes.

\[
\text{Interval} = [\_ \_ \_ \_, \_ \_ \_ \_] \quad 7
\]

8.55. Independent random samples of size 50 are drawn from two quantitative populations, producing the sample information in the table.

<table>
<thead>
<tr>
<th></th>
<th>Sample 1</th>
<th>Sample 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample std. dev.</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Sample mean</td>
<td>50</td>
<td>10</td>
</tr>
<tr>
<td>Sample std. dev.</td>
<td>1.645</td>
<td>1.28</td>
</tr>
</tbody>
</table>

(a) Find the 95% lower bound confidence interval for the difference in the two population means. Go to two significant decimal places (4 places), check = 3.

(b) The mean of the first sample is larger than the second. Is this fact statistically significant at the 95% confidence level? Explain why or why not?

(c) Is this fact statistically significant at the 99% confidence level?

Know these critical values.

<table>
<thead>
<tr>
<th>( \alpha )</th>
<th>( z_{\alpha/2} )</th>
<th>( z_{\alpha} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.10</td>
<td>1.645</td>
<td>1.28</td>
</tr>
<tr>
<td>0.05</td>
<td>1.96</td>
<td>1.645</td>
</tr>
<tr>
<td>0.01</td>
<td>2.58</td>
<td>2.33</td>
</tr>
</tbody>
</table>