1 Problem 1:

1.1 part a:
The interval is $0.055 \pm 0.0317$.

1.2 part b:
The interval is $0.055 \pm 0.031596$.

1.3 part c:
Using Excel, we find that $p_D = 0.0278, p_U = 0.0962$. Hence, the confidence interval is $(0.0278, 0.0962)$.

2 Problem 7.34:
A large sample $95\%$ confidence interval for the difference between the mean resistances to abrasions is:
\[
\bar{x}_1 - \bar{x}_2 \pm z_{0.25}(\sigma_1^2/n_1 + \sigma_2^2/n_2)^{\frac{1}{2}} = 92 - 98 \pm 1.96(20/50 + 30/40)^{\frac{1}{2}} = (-8.1019, -3.8981).
\]

3 Problem 7.36:
A large sample $90\%$ confidence interval for the difference between the mean depths is:
\[
\bar{x}_1 - \bar{x}_2 \pm z_{0.25}(\sigma_1^2/n_1 + \sigma_2^2/n_2)^{\frac{1}{2}} = 0.18 - 0.21 \pm 1.645(((0.02)^2/35) + (0.03)^2/30)^{\frac{1}{2}} = (-0.0406, -0.0194).
\]
If coating $B$ were superior in inhibiting corrosion, then it should have shallower pit depths. Thus, $\mu_A - \mu_B$ would be positive. Since the confidence interval includes negative values(in fact the entire interval is composed of negative values), we can not conclude that coating $B$ is better than coating $A$.

4 Problem 7.37:
We are given $\hat{p}_1 = 43/50 = 0.86$ and $\hat{p}_1 = 22/50 = 0.44$. An approximate $95\%$ confidence interval for the difference between the proportions of samples
containing the harmful bacteria is:
\[
\hat{p}_1 - \hat{p}_2 \pm z_{0.25} \sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}} = 0.86 - 0.44 \pm 1.96 \sqrt{\frac{0.86 \times 0.14}{50} + \frac{0.44 \times 0.56}{50}} = (0.2521, 0.5879).
\]
If the additive is effective in reducing the amount of bacteria, then the difference between the proportions should be positive; i.e., \( p_1 - p_2 > 0 \). The above 95% confidence level is positive indicating that the chemical is effective in reducing the amount of bacteria.

5 Problem 7.39:

A 98% confidence interval for the difference between the proportions voicing no objection to the new policy for the companies is:
\[
\hat{p}_1 - \hat{p}_2 \pm z_{0.01} \sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}} \approx \frac{25}{30} - \frac{26}{32} \pm 2.33 \sqrt{\frac{(25/30)(5/30)}{30} + \frac{(26/32)(10/32)}{30}} = (-0.1193, 0.3574)
\]

6 Problem 7.42:

First we compute \( s_p^2 = \frac{(n_1-1)s_1^2 + (n_2-1)s_2^2}{n_1+n_2-2} = \frac{2(0.02)^2 + 2(0.07)^2}{3+3-2} = 0.00265 \). So, \( s_p = 0.05148 \). Assuming normal populations with equal variance, A 95% confidence interval for the difference between the impulses for the rackets is:
\[
\bar{x}_1 - \bar{x}_2 \pm t_{0.025}s_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}} = 9 - 2.41 - 2.22 \pm 2.776(0.05148)\sqrt{1/3 + 1/3} = (0.0733, 0.3067).
\]

7 Problem 7.47:

From the data, we conclude:

<table>
<thead>
<tr>
<th>Method A</th>
<th>Method B</th>
</tr>
</thead>
<tbody>
<tr>
<td>( n )</td>
<td>7</td>
</tr>
<tr>
<td>( x )</td>
<td>0.6714</td>
</tr>
<tr>
<td>( s )</td>
<td>0.2058</td>
</tr>
</tbody>
</table>

\[
s_p^2 = \frac{6(0.2059)^2 + 7(0.6990)^2}{7+8-2} = 0.2827, s_p = 0.5317.
\]
Assuming that both populations of corrosion rates are approximately normal with common variance, A 90% confidence interval for the difference in mean corrosion rates is:
\[ x_1 - x_2 \pm t_{0.05} s_p \sqrt{1/n_1 + 1/n_2} = 0.6714 - 1.15 \pm 1.771(0.5317)\sqrt{1/7 + 1/8} = (-0.9959, 0.0087). \]