Introduction
This exercise is chosen to test your abilities to design and implement a spreadsheet decision model for productivity problems. Keep in mind that for many if not most business applications, those who design the spreadsheets are not those who will use them on a daily basis. Therefore, your spreadsheet solutions are to be designed for easy use by others. This is a value added skill that organizations are willing to pay you for.

For this exercise, please consider the following desirable characteristics as you design your spreadsheet and be prepared to explain how your design meets these needs:

1) Formulas should never have to be changed by users.
   - Separate formulas from parameters such as prices, usage, etc.

2) Values that may change frequently, like prices, usage, or standards, should be easy to find and change.
   - Often a table of parameters at the top of the worksheet with calculations below works well.

3) Formulas should be entered only once and copied, whenever possible, to avoid errors.
   - Consider how to use rows/columns to your advantage for repeated calculations.

4) Complex calculations should be broken down into several component calculations then aggregated. This facilitates troubleshooting, review, and understanding.
   - For multifactor productivity, calculate the denominator first, and then combine with the numerator.

5) Calculations to be made every month, for example, should be setup to easily expand as time goes by.
   - Consider how to use rows/columns to your advantage for repeated calculations.

6) Whenever possible, find a known (test) problem to develop and check an initial spreadsheet for errors. Then make the modifications needed to convert the test problem to the real problem.

Lab Excel Exercises
Consider problem 1.7 from the text—depending on edition. While I have made minor changes below, use this information, along with problem 1.6, to calculate the single and multifactor productivities and percent change in productivity. Solutions will be posted in Blackboard for your review. For those that do not have your text…

1.6 Eric Johnson makes billiard balls in his New England plant. With recent increases in his costs, he has a new found interest in efficiency. Eric is interested in determining the productivity of his organization. He would like to know if his organization is maintaining the manufacturing average of 3% increase in productivity. He has the following data representing two months worth of production and usage.

<table>
<thead>
<tr>
<th></th>
<th>January</th>
<th>February</th>
<th>March</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units produced</td>
<td>1000</td>
<td>1000</td>
<td>TBD</td>
</tr>
<tr>
<td>Labor (hours)</td>
<td>300</td>
<td>275</td>
<td>TBD</td>
</tr>
<tr>
<td>Resin (pounds)</td>
<td>50</td>
<td>45</td>
<td>TBD</td>
</tr>
<tr>
<td>Capital invested ($)</td>
<td>10,000</td>
<td>11,000</td>
<td>TBD</td>
</tr>
<tr>
<td>Energy (BTU)</td>
<td>3,000</td>
<td>2,850</td>
<td>TBD</td>
</tr>
</tbody>
</table>

1.7 Eric Johnson (using data from Problem 1.6) determines his costs to be as follows
   - Labor $10 per hour
   - Resin $5 per pound
   - Capital 1% per month of investment
   - Energy $.50 per BTU

NOTE—March’s numbers will be given in class…much like it might happen at work…so develop your spreadsheet accordingly. Consider values such as (1250—285—47—11,000—2900) for example.

See a completed spreadsheet for these problems here. The solution video link is on the last page.
FOR ADVANCED EXCEL USERS (but not required)…

If you have worked ahead and want to try something a little more sophisticated, consider that there are several (3) locations for which you are interested in multifactor productivity. You wish to monitor productivity changes over a 12 month period for each location and for the organization as a whole.

How would you structure worksheet(s) to effectively accomplish this?

Some key attributes include…

- Ability to see each location’s results.
- Ability to see organizational results.
- Ability to easily input data, once only as possible.
- Ability to enter formulas once and copy it where needed.
- Built-in error checking.
Solution Video Links

There are two solution video formats below. The streaming version is interactive and you should try these first for the best experience. If the streaming version does not work for you, use the MP4 version instead.

**Streaming Version**
EE Productivity Solution Video

**MP4 Version**
EE Productivity Solution Video