Background Information
In recent decades, the United States economy has increasingly shifted from a basis in manufacturing to one based on services and research. This is especially noticeable in the technology industry, where many companies get their money not from making products but from licensing their patents and other intellectual patents to other companies.

Revenue from the licensing of intellectual property such as patents and copyrights has exploded since 1970. In 1970, about $220 million (in 2016 dollars) was charged for licensing in the United States. By 2015, this number climbed to almost $40 billion.

Problem Statement
In this project, students will explore the change in licensing charges based on different growth rates. The generated values will be compared with data from the World Bank.

Instructions
IMPORTANT: This is not the actual Exam for your section. You will not receive any credit for completing this project.

IMPORTANT: Complete the steps below in the order they are given. Completing the steps out of order may complicate the assignment or result in an incorrect result.
1. Download and extract the provided Data Files ZIP file. It contains the following files for use in this assignment:
   a. **licensing.csv** – World Bank estimate of intellectual property licensing charges for the years 1970 through 2015 [1].

<table>
<thead>
<tr>
<th>Column Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
<td>Number</td>
<td>Year of the data.</td>
</tr>
<tr>
<td>Charges</td>
<td>Currency</td>
<td>Amount charged to license intellectual property in the United States in 2016-valued dollars.</td>
</tr>
<tr>
<td>11.5% Rate</td>
<td>Currency</td>
<td>Licensing charges with 11.5% annual growth.</td>
</tr>
<tr>
<td>12.0% Rate</td>
<td>Currency</td>
<td>Licensing charges with 12.0% annual growth.</td>
</tr>
<tr>
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</tr>
<tr>
<td>13.5% Rate</td>
<td>Currency</td>
<td>Licensing charges with 13.5% annual growth.</td>
</tr>
<tr>
<td>Average</td>
<td>Currency</td>
<td>Empty column.</td>
</tr>
<tr>
<td>Maximum</td>
<td>Currency</td>
<td>Empty column.</td>
</tr>
<tr>
<td>Minimum</td>
<td>Currency</td>
<td>Empty column.</td>
</tr>
<tr>
<td>Class</td>
<td>Text</td>
<td>Empty column.</td>
</tr>
</tbody>
</table>

2. Create a new Microsoft Excel workbook named *lastname_firstname_er1_iplp.xlsx*.

3. We must adjust the sheets in our workbook.
   a. Rename Sheet1 to **Licensing Charges**.
   b. Add a new sheet named **Analysis Questions**.

4. Import the following item into the workbook:
   a. **licensing.csv** file – Import starting in cell A4 of the **Licensing Charges** sheet. The file is comma-delimited. Its first row contains headers.

5. We wish to apply formatting to the **Licensing Charges** sheet.
   a. We must setup a table to store data on licensing charges.
      i. If a table does not already exist in cells A4 through K50, create one using a style of your choice. The table has headers and will overlap external data ranges. If prompted, convert the selection to a table and remove all external connections.
      ii. If a table already exists in cells A4 through K50, format the table using a style of your choice other than the default table style.
   b. For the table, turn on the **Total Row** option.
c. Enter text in the cells as indicated below:
   i. **A1**: IP Licensing Charges
   ii. **A3**: Annual Growth Rate:
   iii. **C3**: 11.5%
   iv. **D3**: 12.0%
   v. **E3**: 12.5%
   vi. **F3**: 13.0%
   vii. **G3**: 13.5%
   viii. **A51**: Average

d. Merge-and-center cells **A1** through **K1**.

e. Merge (but not center) cells **A3** through **B3**.

f. Apply the *Title* cell style to cell **A1**.

6. We need to perform calculations to analyze the *Licensing Charges* sheet data.
   a. We would like to summarize the charges and projections.
      i. In the total row, individually average columns **B** through **G**.
      ii. In the total row, do not display any statistics in columns **H** through **K**.

7. On the *Licensing Charges* sheet, we wish to calculate licensing estimates with different assumptions about the carrying capacity and growth rate.
   a. We want to estimate future licensing charges values.
      i. Enter the formula into the cell as indicated below.

      **HINT**: To avoid errors, copy-and-paste the provided formula.
      
      (1) **C6**: =C5*(1+C3)^(A6-A5)
ii. We must adjust the future values formula so its cell references are correct when the formula is copied.

In cell C6, modify the cell references so they are column-absolute mixed, row-absolute mixed, or relative references as indicated:

\[ C5 \times (1 + C3)^{(A6 - A5)} \]

iii. We will now AutoFill the modified formula. Enter the formula into the cells as indicated below:

(1) C6 through G50: AutoFill the formula from cell C6.

b. In column H, write a formula that, for each year, uses a function to find the average of the projected licensing charges. Compare each year’s projections from columns C through G.

c. In column I, write a formula that, for each year, uses a function to find the highest of the projected licensing charges. Compare each year’s projections from columns C through G.

d. In column J, write a formula that, for each year, uses a function to find the lowest of the projected licensing charges. Compare each year’s projections from columns C through G.

e. In column K, calculate the licensing charges class by nesting IF() functions to display a class according to the following rules:

i. Class of A if the average of projected licensing charges was more than $30,000,000,000.

ii. Class of B if the average of projected licensing charges was between $10,000,000,000 and $30,000,000,000.

iii. Class of C if the average of projected licensing charges was less than $10,000,000,000.

8. We must apply additional formatting to the Licensing Charges sheet.

a. Format the cells as indicated below:

i. B5 through J51: currency with no decimal places
b. AutoFit the widths of columns A through K.

c. Apply the Green-Yellow-Red color scale conditional formatting option to cells B5 through G50.

9. We would like to create a chart to plot the licensing charges over time.

a. Create a 2-D line chart based on cells A4 through B50 of the Licensing Charges sheet. Move the chart to a new sheet named Licensing Charges Chart.

Ensure that the years are shown as labels for the horizontal (category) axis, not plotted as chart data. Specify appropriate chart and axis titles.

b. Add a trendline based on the licensing charges. Use the trendline type that best fits the data and project the values forward 20 periods (through the year 2035). Display the R-squared value on the chart.

**NOTE:** You cannot use the Moving Average type for your trendline.

10. To better understand our data, we wish to create a PivotTable.

a. Create a new PivotTable based on the data in cells A4 through K50 of the Licensing Charges sheet. Place the PivotTable on a new sheet named Licensing Charges PivotTable.

b. On the PivotTable, do the following:

i. Add the year as a **Rows** field.

ii. Add the charges as a **Values** field.

11. We need to set up the Analysis Questions sheet so that it can store responses to the analysis questions.

a. Enter text in the cells as indicated below:

i. **A1:** Question Number

ii. **B1:** Response

b. Bold the contents of row 1.

c. AutoFit the width of column A. Set the width of column B to 100 (8.39”).

d. Set the height for rows 2 through 5 to 110 (1.53”).
e. Change the vertical alignment setting for columns **A** and **B** so that the text is displayed at the top of each row.

f. Turn on text wrapping for column **B**.

12. Starting in row 2 of the **Analysis Questions** sheet, answer four of the five analysis questions below. Respond to one question per row.

a. Which trendline type did you use on **Licensing Charges Chart**? Why did you choose this type of trendline?

b. Why might a company choose to license its intellectual property to others rather than keep it just for itself?

c. Historically, patents have been for physical inventions like machines. In recent years, procedures and processes have become increasingly patented. For example, Amazon.com received a patent for its one-click buying process [2]. Do you think patents like this should be allowed? Why or why not?

d. Many technology standards, such as those used for cell phones and computer networks, incorporate patented technology for which would-be users must acquire licenses. Do you think it is a good idea to allow patented technology to be incorporated into standards like this? Explain your rationale.

e. Do you think companies be required to license their intellectual property to others? Should there be any limit on the price they can charge? Explain your rationale.

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**Grading Rubric**

This is a practice assignment and is worth no points. A comparable Exam would be is worth 100 points and graded using this rubric, with partial credit awarded as appropriate:

<table>
<thead>
<tr>
<th>Steps 3a-b</th>
<th>3 points total</th>
<th>Steps 8a-c</th>
<th>6 points total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 4</td>
<td>5 points</td>
<td>Step 9a</td>
<td>6 points</td>
</tr>
<tr>
<td>Steps 5a-f</td>
<td>8 points total</td>
<td>Step 9b</td>
<td>4.5 points</td>
</tr>
<tr>
<td>Step 6a</td>
<td>5 points</td>
<td>Steps 10a-c</td>
<td>7.5 points total</td>
</tr>
<tr>
<td>Step 7a</td>
<td>15 points</td>
<td>Steps 11a-f</td>
<td>5 points total</td>
</tr>
<tr>
<td>Steps 7b-e</td>
<td>15 points total</td>
<td>Steps 12a-e (pick 4 of 5)</td>
<td>5 points each</td>
</tr>
</tbody>
</table>
EXAM REVIEW PROJECT INSTRUCTIONS

Exam #1 Review

IP Licensing Problem

The analysis questions in Steps 12a-e will be evaluated using this rubric:

<table>
<thead>
<tr>
<th>Standard</th>
<th>Meets Requirements (2.5 points)</th>
<th>Does Not Meet Requirements (0 points)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Answer is reasonable.</td>
<td>Answer addresses the question prompt and is factually correct or a reasonable interpretation of available data.</td>
<td>Answer does not address the question prompt, is factually incorrect, or is an unreasonable interpretation of available data.</td>
</tr>
<tr>
<td>Answer is supported.</td>
<td>Logical rationale is provided to support the given answer.</td>
<td>Logical rationale is not provided to support the given answer.</td>
</tr>
</tbody>
</table>

Acknowledgments

The image in the introduction appears courtesy of the United States Patent and Trademark Office [3].

References