Instructions: This worksheet must be turned in with the summary paper by December 6. Complete each question, and if you are asked to make a computation, show all of your work. Write neatly and legibly. Points may be deducted if answers are incorrect, incomplete, or messy.

I. Linear and Exponential Growth

The linear and exponential models are commonly used in population projections. The goal of this project is to obtain a better understanding these models.

1. Describe and compare linear and exponential growth.

2. Give 5 examples of each type of growth explaining why it would be linear/exponential growth (LG or EG).

   • Example 1
     – Linear growth:
     – Exponential growth:
• Example 2:
  – Linear growth:
  
  – Exponential growth:

• Example 3:
  – Linear growth:
  
  – Exponential growth:

• Example 4:
  – Linear growth:
  
  – Exponential growth:

• Example 5:
  – Linear growth:
  
  – Exponential growth:
II. Developing a Population Model

The U.S. Census’s annual estimates of the resident population for incorporated places over 100,000, ranked by July 1, 2009 population: April, 2000 to July 1, 2009 are given at


Using the data, answer the following questions.

1. Select a U.S. city: ____________________.


<table>
<thead>
<tr>
<th>Year</th>
<th>Population of Your City</th>
<th>Year</th>
<th>Population of Your City</th>
</tr>
</thead>
<tbody>
<tr>
<td>1910</td>
<td></td>
<td>1960</td>
<td></td>
</tr>
<tr>
<td>1920</td>
<td></td>
<td>1970</td>
<td></td>
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<tr>
<td>1930</td>
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<td>1980</td>
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<td>1940</td>
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<td>1990</td>
<td></td>
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<tr>
<td>1950</td>
<td></td>
<td>2000</td>
<td></td>
</tr>
</tbody>
</table>

3. Find the absolute and relative change in population during this period (decade to decade and overall).

<table>
<thead>
<tr>
<th>Years</th>
<th>Absolute Change</th>
<th>Relative Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1910-1920</td>
<td></td>
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<td>1920-1930</td>
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<td>1930-1940</td>
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<td>1980-1990</td>
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<tr>
<td>1990-2000</td>
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</tbody>
</table>
4. Can you see any big gaps in your data? Can you explain any big changes (if that is the case)?

5. Plot your data on a graph and draw a line that visually fits the data well.
6. Find the equation of the line you drew for the previous question.

7. Use the linear model (that you developed) to predict the population for 2001, 2004, and 2009.

   Population for 2001: __________

   Population for 2004: __________

   Population for 2009: __________

8. Develop an exponential equation to model your population data, and sketch it on your graph in question #5.

Population for 2001: __________

Population for 2004: __________

Population for 2009: __________

10. How do these values compare to the values you found using a linear model?

For 2001:

For 2004:

For 2009:

11. Find the estimated population for 2001, 2004, and 2009 using the U.S. Census web site and compare it to the value that your models predicted.

For 2001: __________

For 2004: __________

For 2009: __________
12. In your opinion, which graph/model better represents the population of your city? Explain.