**MATH133 – Unit 5 Individual Project**

**NAME (Required): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Please show all work details with answers, insert the graph, and provide answers to all of the critical thinking questions on this document.**

In this assignment you will study an exponential function that is similar to Moore’s Law that was formulated by Dr. Gordon Moore, cofounder and Chairman Emeritus of Intel Corporation.

Here is a table representing the number of transistors in Intel CPU chips between the years 1971 and 2000.

|  |  |  |
| --- | --- | --- |
| **Processor** | **Transistor Count** | **Year of Introduction** |
| Intel 4004 | 2,300 | 1971 |
| Intel 8085 | 6,500 | 1976 |
| Intel 80286 | 134,000 | 1982 |
| Intel 80486 | 1,180,235 | 1989 |
| Pentium Pro | 5,500,000 | 1995 |
| Pentium 4 | 42,000,000 | 2000 |
| Core 2 Duo | ? | 2006 |
| Core 2 Duo and Quad Core + GPU Core i7 | ? | 2011 |

If we let equal the number of years after 1971 (the year 1971 means ), then this data can be mathematically modeled by the exponential function, .

**For each question, be sure to show all your work details for full credit.** **Round all value answers to three decimal places.**

1. Graph your function using Excel or another graphing utility. (In order for the graph to show up in the viewing window, use the -axis scale of [-10, 50] and for the -axis scale use **[**-10,000,000**,** 4,000,000,000**]**). (There are free downloadable programs like [Graph 4.4.2](http://www.padowan.dk/) or Microsoft’s [Mathematics 4.0](https://www.microsoft.com/en-us/default.aspx); or online utilities like [this](http://www.desmos.com) [site](https://www.desmos.com/); and there are many others.) Insert the graph into the supplied Student Answer Form. Be sure to label and number the axes appropriately so that the graph matches the chosen and calculated values from above.
2. Based on this function, what would be the predicted transistor count for the years 2006 and 2011? Show all the calculation details.
3. Using the Library or Internet resources, find the actual transistor count in the years 2006 and 2011 for Intel’s Core 2 Duo and Quad Core + GPU Core i7, respectively. Compare these values to the values predicted by the function in part 2 above. Are the actual values over or under the predicted values and by how much? Explain what this information means in terms of the mathematical model function, . Does it appear that functions created to be “best fit” functions for empirical chronological data are good at predicting future values? Be sure to reference your source(s).
4. For what value of will this function, predict the value ? Show all the calculation details.
5. Examine the connection between the exponential and logarithmic forms to your problem. First, for if and only if both equations give the exact same relationship among x, y, and b. Next, use the rule of logarithms, . Applying the given relations, convert the function, , into logarithmic form. Then, examine the function, . Discuss this conversion and demonstrate the inverse function relationship between the functions, and ?

**References**

*Desmos*. (n.d.). Retrieved from <https://www.desmos.com/>

*Graph 4.4.2*. (n.d.). Retrieved from the Graph Web site: <http://www.padowan.dk/>

*Mathematics 4.0*. (n.d.). Retrieved from the Microsoft Web site: https://www.microsoft.com/en-us/default.aspx