

# [Exponential function essay sample](https://assignbuster.com/exponential-function-essay-sample/)

An example of an exponential function is the voltage as a function of time Vf(t) as the capacitor C1 discharges from an initial voltage Vi to a resistive load R1. The circuit of this is shown below

Figure 1. Discharge of Capacitor

Where

Vf is the final voltage

Vi is the initial voltage across the C1

|  |  |  |
| --- | --- | --- |
| Time  | Calculated Value  | Oscilloscope Reading  |
| 0. 05  | 7. 278  | 7. 300  |
| 0. 10  | 4. 415  | 4. 500  |
| 0. 15  | 2. 678  | 2. 700  |
| 0. 20  | 1. 624  | 1. 700  |
| 0. 25  | 0. 985  | 1. 000  |
| 0. 30  | 0. 597  | 0. 700  |
| 0. 35  | 0. 362  | 0. 400  |
| 0. 40  | 0. 220  | 0. 200  |
| 0. 45  | 0. 133  | 0. 100  |
| 0. 50  | 0. 081  | 0. 000  |

Table 1. Calculated and Oscilloscope Voltages

Figure 2. Calculated Voltages

Figure 3. Oscilloscope Voltages

Logarithmic Function

An example of an logarithmic function is the Sound Pressure Level which is expressed in decibels.

SPL = 20 log(P/P0)                        (dangerousdecibels. org, 2005)

Where:

SPL     is the sound pressure level in decibels

P0        is the reference threshold of hearing, 2 x 10 -5 N/m 2

P         is the measured pressure amplitude in N/m 2

|  |  |
| --- | --- |
| P  | SPL  |
| Calculated  | Measured  |
| 0. 00001  | -6. 021  | -6. 000  |
| 0. 00005  | 7. 959  | 8. 000  |
| 0. 0001  | 13. 979  | 14. 000  |
| 0. 0005  | 27. 959  | 28. 000  |
| 0. 001  | 33. 979  | 34. 000  |
| 0. 005  | 47. 959  | 48. 000  |
| 0. 01  | 53. 979  | 54. 000  |
| 0. 05  | 67. 959  | 68. 000  |
| 0. 1  | 73. 979  | 74. 000  |
| 0. 5  | 87. 959  | 88. 000  |
| 1  | 93. 979  | 94. 000  |
| 5  | 107. 959  | 108. 000  |
| 10  | 113. 979  | 114. 000  |
| 50  | 127. 959  | 128. 000  |
| 100  | 133. 979  | 134. 000  |

Table 2. Calculated and Measured Sound Pressure Levels

Figure 5. Calculated Sound Pressure Levels

Figure 6. Measured Sound Pressure Levels

Appendix

Spreadsheet  for Exponential Function

Spreadsheet  for Logarithmic Function

References

” Sound Measures”. DangerousDecibels. org website: http:// www. dangerousdecibels. org/teachers\_guide/DDB\_TRG\_Activities\_10. pdf on May 1, 2007