# What Is Log?

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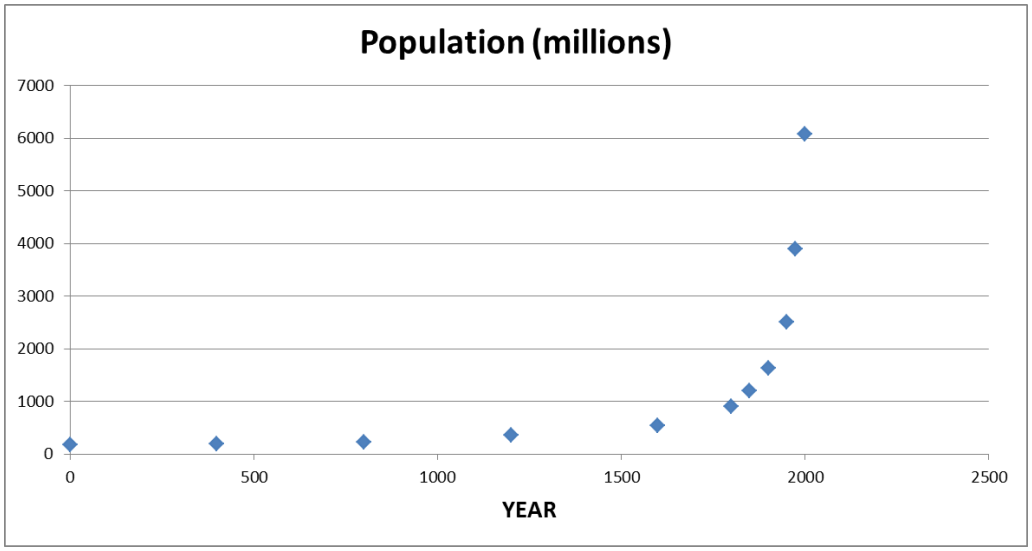
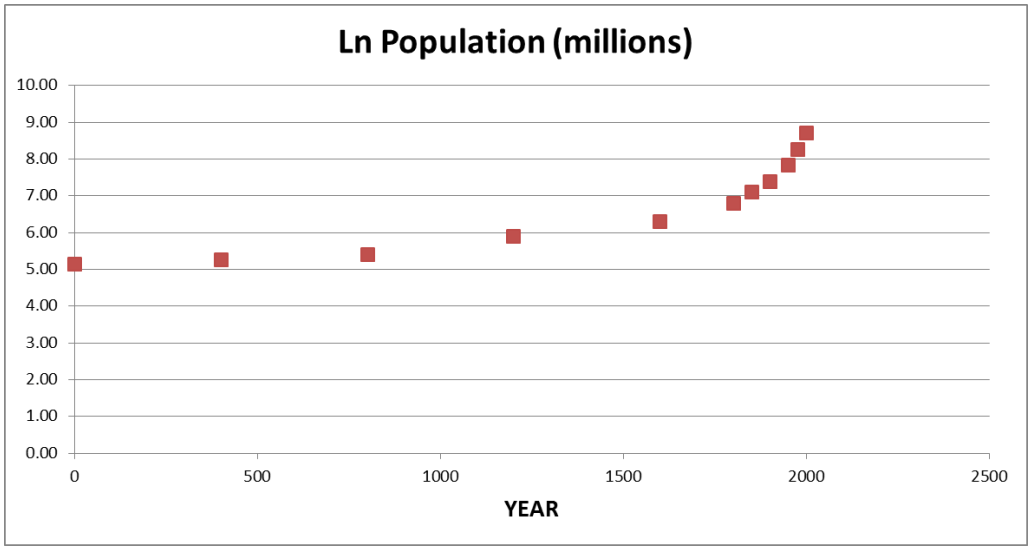
| Year | Population (millions) | Ln (population) |
|---|---|---|
| 1 | 170 | 5.14 |
| 400 | 190 | 5.25 |
| 800 | 220 | 5.39 |
| 1200 | 360 | 5.89 |
| 1600 | 545 | 6.30 |
| 1800 | 900 | 6.80 |
| 1850 | 1200 | 7.09 |
| 1900 | 1625 | 7.39 |
| 1950 | 2500 | 7.82 |
| 1975 | 3900 | 8.27 |
| 2000 | 6080 | 8.71 |

# What Is Log?

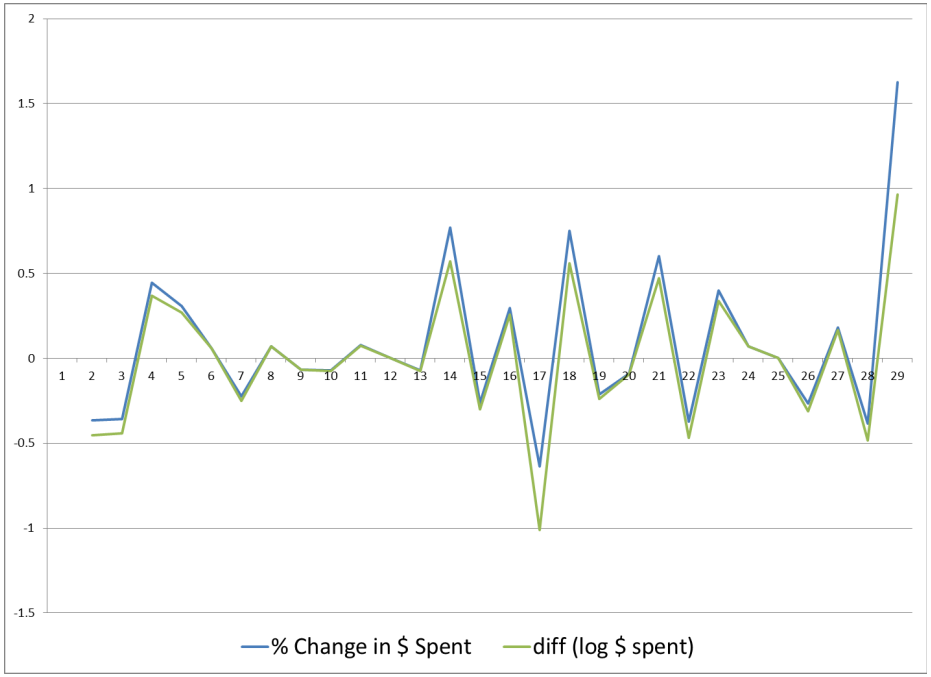

Population (millions)
7000
6000
5000
4000
3000
2000
1000
0
0
500
1000
1500
2000
2500
YEAR


Ln Population (millions)
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0
500
1000
1500
2000
2500
YEAR

# Log and Percentage Change

First difference of natural LOG = percentage change:

- Logging converts absolute differences into relative (i.e., percentage) differences.
- The series DIFF(LOG(Y)) represents the percentage change in Y from period to period.



# Elasticity: Log/Log Models

Dependent Variable : ln ($ Spent)

| | Coefficients | Standard Error | t Stat | P-value |
|---|---|---|---|---|
| Intercept | 2.24 | 0.07 | 32.06 | 0.00 |
| log(num promo + 1) | 0.32 | 0.05 | 6.44 | 0.00 |

0.317 = change in log ($ spent) when log(num promo) increases by 1 unit

| | | | |
|---|---|---|---|
| **log($ spent) when log(num promo) is 0** | **=** | **2.236** | **(1)** |
| **log($ spent) when log(num promo) is 1** | **=** | **2.553** | **(2)** |
| **(1) – (2)** | **=** | **0.317** | |