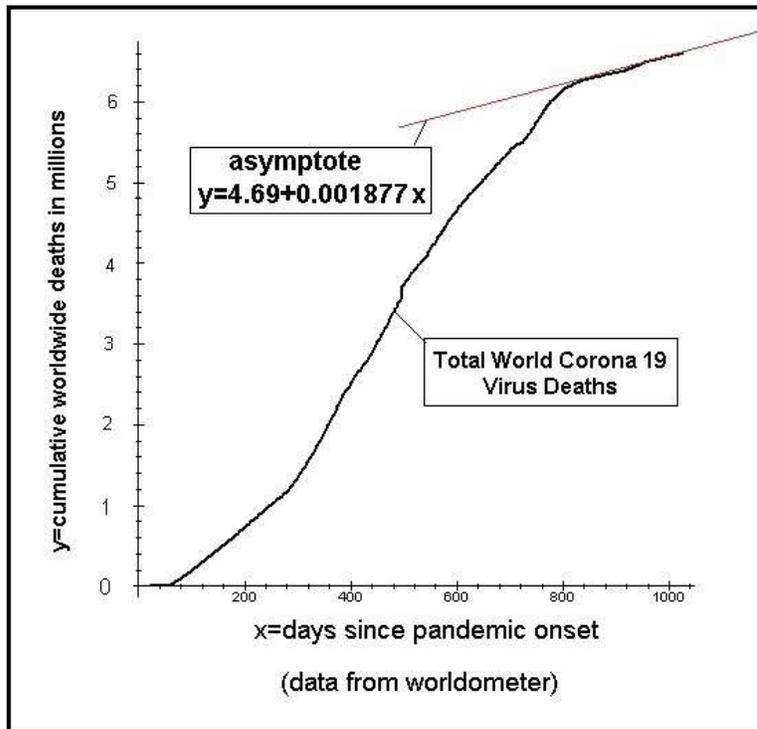
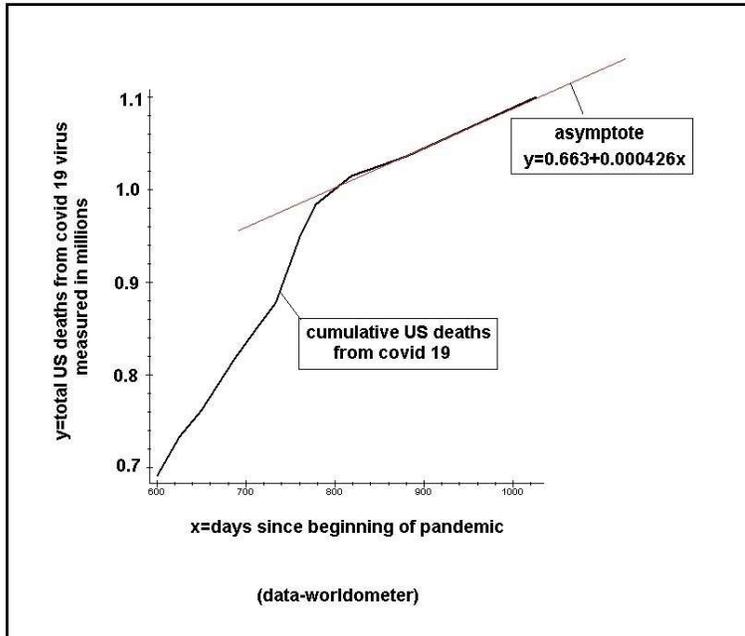


USE OF ASYMPTOTIC FORMULAS TO PREDICT FUTURE CORONA VIRUS DEATHS

It is now the 1026s day since covid 19 was declared a worldwide pandemic by the world health organization(WHO). We have constructed graphs based on Worldometer data since that initial declaration showing the cumulative deaths $y(x)$ as a function of days x after the initial declaration. Here are two of the most important graphs showing cumulative deaths in millions both world-wide and in the USA-



and-



We observe that the trend for $y(x)$ in both graphs is almost identical. However, the US number is about four times larger in magnitude than it should be based upon the population ratio of 331 million to 7.837 billion. What is most interesting is that $y(x)$ bends sharply to the right and retains a linear asymptotic form $y(x)=A+Bx$ after that starting around day $x=800$. We can interpret the resultant sharp bend to the right as the end of the covid pandemic. The linear behavior after that implies a future constant yearly death number not unlike encountered for the common flu.

It is our purpose here to develop the precise forms for the two asymptotes y_{world} and y_{usa} associated with world-wide and local USA cases. Once this has been accomplished future predictions concerning virus deaths become possible assuming the $y(x)$ remains linear.

Our starting point is to choose two points on the $y(x)$ curves after they have passed the indicated knee. We choose to look at $x=870$ and $x=1026$. Here is a table for these points-

x=days since pandemic start	Y_{world} =World cumulative numbers	y_{usa} =United States cumulative numbers
870	6,319,375	1,033,369
1026	6,612,328	1,099,856

For the world-wide case these numbers yield $B=292953/156=1877.9038$ and $A=6613328-1026B=4,685598.7$. Hence we have the asymptote-

$$y_{world}=4.69+0.001877 x$$

, where y is measured in millions. Next we look at the USA numbers. It yields-

$$y_{usa}=0.663+0.000426 x$$

These two asymptotes can now be used to make future predictions. Let us look at the USA case and ask what will be the expected covid deaths between now($x=1026$) and a year from now($x=1026+365=1391$). The answer is-

$$y(\text{year from now})=6.612+0.000426(365) \text{ million}$$

This means a 155 thousand increase per year under these steady state post pandemic conditions. This same result can be established even faster by using the table directly. It gives the same value-

$$[(1099856-1033369)(365)/156]=155 \text{ thousand}$$

This number seems a bit high since it yields a yearly death rate about three to four times higher than for the common flu. It suggests that the linear asymptotes will show a decrease in B in the future or that we are just faced with a large continuing 155k per year post pandemic death rate from covid.

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