Exponential Growth – Practice Calculations

Perform the following calculations using the exponential growth equation: $N = N_o e^{kt}$

N	N_o	k	t
18.6	15.8	0.023	7
41.6	34.5	0.047	4
7.2	6.3	0.015	9
23.5	17.2	0.052	6
114	88.3	0.017	15
101	47.8	0.075	10
223	123	0.033	18
6.69	1.65	0.14	10
5.16	3.88	0.095	3
165	92.1	0.083	7

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1. You deposit $1500 in an account that pays 5% interest yearly. How much money do you have after 6 years?

$2025

2. If I have $500 in my account after 4 years investing at 2.5% per year, how much money did I start with?

$452

3. A mouse population is 25,000 and is decreasing in size at a rate of 20% per year. What is the mouse population after 3 years?

13720

4. The population of a city grows at a rate of 5% per year. The population in 1990 was 400,000. What would be the predicted current population? In what year would we predict the population to reach 1,000,000?

805,000; a little over 14 years

5. For those of you who are less afraid of math, use the rearranged variation of the exponential growth equation (shown below) to answer the last part of the last question. $\mathbf{t = (1/k)\ln(N/N_o)}$ where all variables are defined exactly as we did for the exponential growth equation.

~ 18 years

6. A population is growing at a rate of 5% per year. In what year would we predict the population to double? Use the doubling time equation.

14 years

7. A hypothetical strain of bacteria doubles every 5 minutes (*exponential growth*). One single bacterium was put in a sealed bottle at 9:00 AM, and the bottle was filled at exactly 10:00 AM. At what time was the bottle one-half full? Think in terms of the doubling time.

9:55 am

8. Use the doubling time equation to estimate an answer to the last part of question 4.