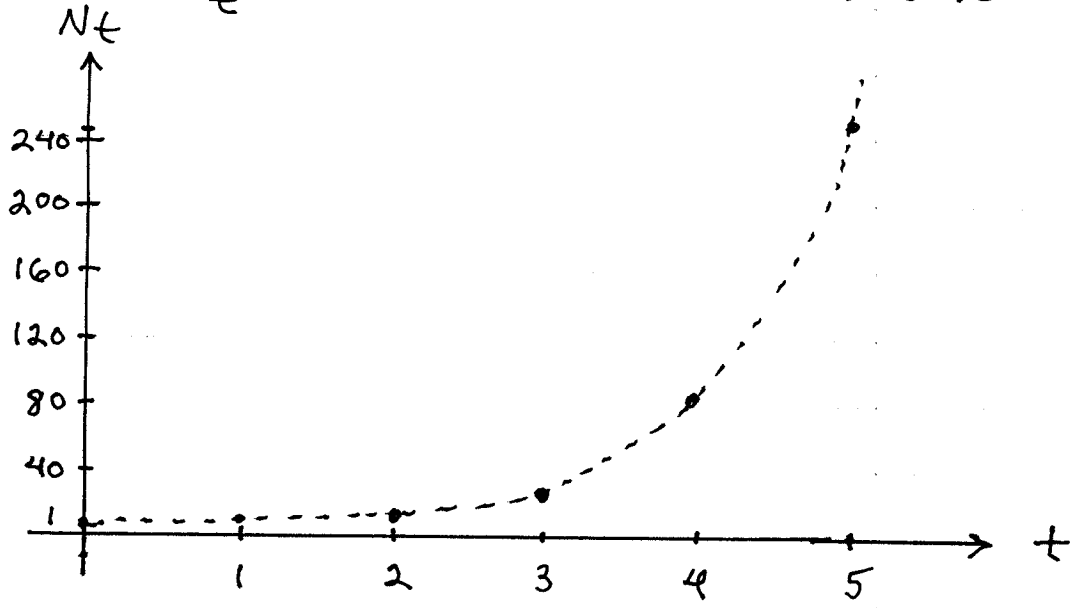
Section 2.1

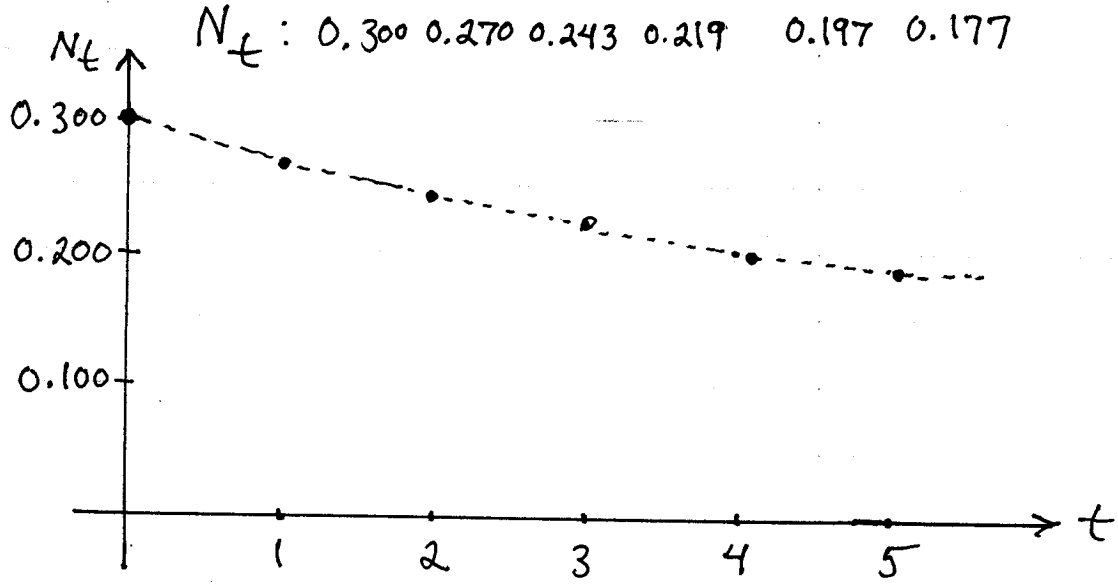
1.) $N_t = 3^t$;

t:	0	1	2	3	4	5
N_t:	1	3	9	27	81	243



4.) $N_t = (0.3)(0.9)^t$;

t:	0	1	2	3	4	5
N_t:	0.300	0.270	0.243	0.219	0.197	0.177



5.)

t:	0	1	2	3	4	5
N_t:	2	4	8	16	32	64
	2^1	2^2	2^3	2^4	2^5	2^6

$N_t = 2^{t+1}$ for $t = 0, 1, 2, 3, \ldots$

6.) t: 0 1 2 3 4 5

N_t: 4 8 16 32 64 128

2^2 2^3 2^4 2^5 2^6 2^7

$N_t = 2^{t+2}$ for $t = 0, 1, 2, 3, \ldots$

7.) t: 0 1 2 3 4 5

N_t: 1 4 16 64 256 1024

4^0 4^1 4^2 4^3 4^4 4^5

$N_t = 4^t$ for $t = 0, 1, 2, 3, \ldots$

8.) t: 0 1 2 3 4 5

2 → 120 m. 4 → 240 m.

N_t: 6 48 384

$6 \cdot 2^0$ $6 \cdot 2^3$ $6 \cdot 2^6$

$6 \cdot 2^0$ $6 \cdot 2^{1.5}$ $6 \cdot 2^3$ $6 \cdot 2^{4.5}$ $6 \cdot 2^6$ $6 \cdot 2^{7.5}$

$N_t = 6 \cdot 2^{1.5t}$ for $t = 0, 1, 2, 3, \ldots$

9.) t: 0 1 2 3 4 5

2 → 30 m. 4 → 60 m.

N_t: 2 8 32

$2 \cdot 4^0$ $2 \cdot 4^1$ $2 \cdot 4^2$

$2 \cdot 4^0$ $2 \cdot 4^{1/2}$ $2 \cdot 4^1$ $2 \cdot 4^{3/2}$ $2 \cdot 4^2$ $2 \cdot 4^{5/2}$

$N_t = 2 \cdot 4^{\frac{1}{2}t} = 2 \cdot 2^t = 2^{t+1}$ for $t = 0, 1, 2, 3, \ldots$

12.) $N_t = 100 \cdot 2^t$ for $t = 0, 1, 2, 3, \ldots$
(2 hr. units)

$t = 0 \rightarrow N_t = 100 \cdot 2^0 = 100 \cdot (1) = 100$,
if $N_t = 300$ then

$$100 \cdot 2^t = 300 \rightarrow$$

$$2^t = 3 \rightarrow$$

$$\ln 2^t = \ln 3 \rightarrow$$

$$t \cdot \ln 2 = \ln 3 \rightarrow$$

$$t = \frac{\ln 3}{\ln 2} \approx 1.585 \text{ units} \rightarrow$$

$(1.585)(2) = 3.17$ hrs.

13.) Let N_t be # of bacteria at hour t;

t:	0	1	2	3	4	5
N_t:	1	2	4	8	16	32

17.) Let N_t be # of bacteria at t minutes;

t:	0	10	20	30	40	50
N_t:	3	6	12	24	48	96

In 50 minutes there are 90 bacteria.

20.) Let N_t be size of population at time t;

t : 0 1 2 3 4 ... t

N_t : 53 106 212 424 848 ...

$53 \cdot 1$ $53 \cdot 2$ $53 \cdot 2^2$ $53 \cdot 2^3$ $53 \cdot 2^4$ ... $53 \cdot 2^t$

so $\boxed{N_t = 53 \cdot 2^t}$ for $t = 0, 1, 2, 3, \ldots$

22.) Let N_t be size at time t;

t : 0 1 2 3 4 ... t

N_t : 72 $72 \cdot 3$ $72 \cdot 3^2$ $72 \cdot 3^3$ $72 \cdot 3^4$ ... $72 \cdot 3^t$

so $\boxed{N_t = 72 \cdot 3^t}$ for $t = 0, 1, 2, 3, \ldots$

26.) $N_{t+1} = 2 \cdot N_t$ and $N_0 = 37$ for $t = 0, 1, 2, 3, \ldots$

29.) $N_{t+1} = 4 \cdot N_t$ and $N_0 = 30$ for $t = 0, 1, 2, 3, \ldots$

37.) $N_{t+1} = 3 N_t$ and $N_0 = 2$ so

$N_1 = 3 N_0 = 3(2) = 6$,
$N_2 = 3 N_1 = 3(6) = 18$,
$N_3 = 3 N_2 = 3(18) = 54$,
$N_4 = 3 N_3 = 3(54) = 162$,
$N_5 = 3 N_4 = 3(162) = 486$

42.) $N_{t+1} = \frac{1}{2} N_t$ and $N_0 = 4096$ so

$N_1 = \frac{1}{2} N_0 = \frac{1}{2}(4096) = 2048$,
$N_2 = \frac{1}{2} N_1 = \frac{1}{2}(2048) = 1024$,
$N_3 = \frac{1}{2} N_2 = \frac{1}{2}(1024) = 512$,
$N_4 = \frac{1}{2} N_3 = \frac{1}{2}(512) = 256$,
$N_5 = \frac{1}{2} N_4 = \frac{1}{2}(256) = 128$

47.) $N_{t+1} = 2 N_t$ and $N_0 = 15$ so

$N_1 = 2 \cdot N_0 = 2(15)$,
$N_2 = 2 \cdot N_1 = 2(2(15)) = 2^2(15)$,
$N_3 = 2 \cdot N_2 = 2(2^2(15)) = 2^3(15)$,
$N_4 = 2 \cdot N_3 = 2(2^3(15)) = 2^4(15)$, ...

$\boxed{N_t = 15 \cdot 2^t}$ for $t = 0, 1, 2, 3, \ldots$

54.) $N_{t+1} = \frac{1}{2} N_t$ and $N_0 = 2300$ so

$N_1 = \frac{1}{2} N_0 = \frac{1}{2}(2300)$,
$N_2 = \frac{1}{2} N_1 = \frac{1}{2} \cdot \frac{1}{2}(2300) = \left(\frac{1}{2}\right)^2 (2300)$,
$N_3 = \frac{1}{2} N_2 = \frac{1}{2} \cdot \left(\frac{1}{2}\right)^2 (2300) = \left(\frac{1}{2}\right)^3 (2300)$,
$N_4 = \frac{1}{2} N_3 = \frac{1}{2} \cdot \left(\frac{1}{2}\right)^3 (2300) = \left(\frac{1}{2}\right)^4 (2300)$, ...

$\boxed{N_t = 2300 \cdot \left(\frac{1}{2}\right)^t}$ for $t = 0, 1, 2, 3, \ldots$