Math 1030 #11b
Linear Growth vs Exponential Growth
The Impact of Doubling

The power of doubling can be seen in this example:

EX 1:

Your rich uncle gives you a dollar and says, "I will double this amount tomorrow and double that amount the next day. I will continue this as long as you do not miss any part of a day of school."

a) How much will you get on the sixth continuous day of attending school?

b) On what day will he have to give you over a million dollars?

EX 2:

Say that a bacteria growing in a lab doubles every 3 minutes. You begin at noon with 2 bacteria in a bottle. In 2 hours, the bottle is full.

a) How many bacteria fit in the bottle?

b) At what time is the bottle half-full?

c) What percent of the bottle is filled at 1:51 ?
note:

EX 3:

Seventy percent of the surface of the earth is covered with water. That leaves about 1.53×10^{14} m^2 of 'land'. If the population in the year 2000 was six billion and the population doubles every fifty years, when will we each have only 1 m^2 of space to occupy?

$n = 0$ in year 2000
$n =$ # of 50 yr increments

Note: $1.53 \times 10^{14} \div (6 \times 10^9) \simeq 25{,}500$

year	n	population	space to occupy
2000	0	$6{,}000{,}000{,}000 = 6 \times 10^9$	25,500
2050	1	$2(6 \times 10^9) = 12 \times 10^9$	$25500\left(\frac{1}{2}\right) = 12750$
2100	2		
2150	3		
⋮	⋮		