Math 1030 #11b
Linear 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?
EX 3: Seventy percent of the surface of the earth is covered with water. That leaves about $1.53 \times 10^{14}$ 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?

<table>
<thead>
<tr>
<th>year</th>
<th>n</th>
<th>population</th>
<th>Space to occupy</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>0</td>
<td>$6,000,000,000 = 6 \times 10^7$</td>
<td>25,500</td>
</tr>
<tr>
<td>2050</td>
<td>1</td>
<td>$2(6 \times 10^7) = 12 \times 10^7$</td>
<td>$25,500(\frac{1}{2}) = 12,750$</td>
</tr>
<tr>
<td>2100</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2150</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:**

$\frac{1.53 \times 10^{14}}{6 \times 10^7} \approx 25,500$