Exponential Growth

1.) Imagine that you have a savings account that is earning “10%”. This means that after one year, you will have 1.10 times your original amount on deposit. What happens if you leave that money on deposit another year? Each year your ending balance is 1.10 times your balance of a year before.

On a separate piece of paper, use a calculator to quickly fill up a table like this for 20 years, where you multiply each year’s balance by 1.10 to find the next year’s amount, starting with $100:

Year	Amount
0	$100.00
1	$110.00
2	$121.00
3	$133.10
4	$146.41

2.) Graph the year (along the bottom) vs the amount (going up) on the *semi-log* paper on the back of this sheet. You should get a straight line. Do you? Use a straight-edge to draw in the line that connects the dots.

3.) Now, let’s try to find the “doubling time” for your hundred dollars from this graph. From your graph, find the time that it takes for your money to increase from $100 to $200.

________ years

Now instead, find the time for your money to increase from $300 to $600 years.

_______ years. Is this the same answer as above?

4.) It is thought that the amount of U.S. railroad track in the late 1800s was growing approximately exponentially. Using a portion of your horizontal axis, mark off the years 1860 – 1890 (you don’t have to label every year. Just label every 5 or every 10, but spaced out a bit), graph this data and draw a straight, “best fit” line. Using your graph, can you find the approximate “doubling time” for railroad mileage?

Year	Miles of railroad track
1860	30,626
1870	52,922
1880	93,262
1890	166,703