Doubling Time *Use a spreadsheet, a table, or a graph to estimate how long it takes for an amount to double if it is invested at 6% interest* [1]

a. *Compounded annually.*

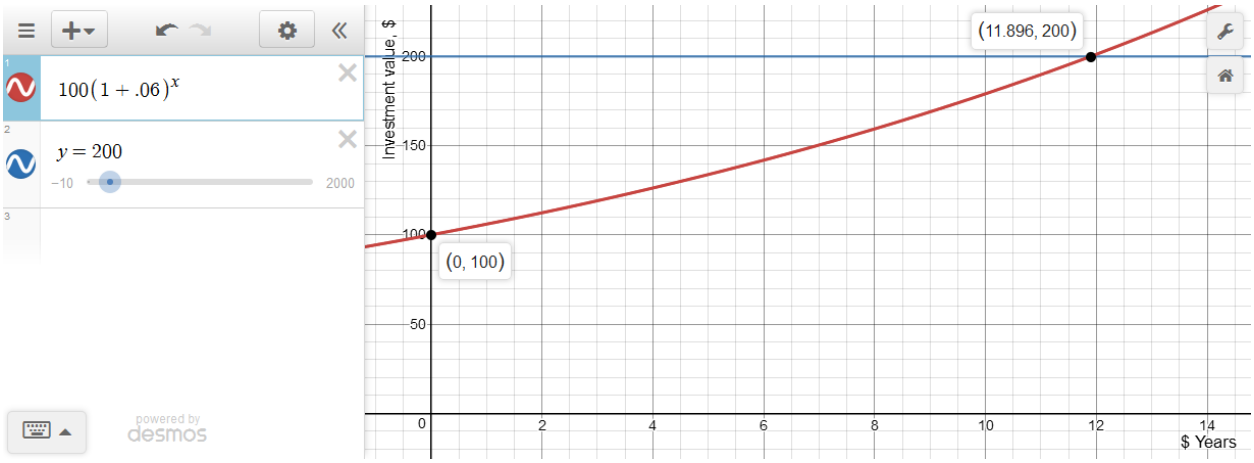
Here's the rule for this situation:

Future Value of an Investment with Annual Compounding

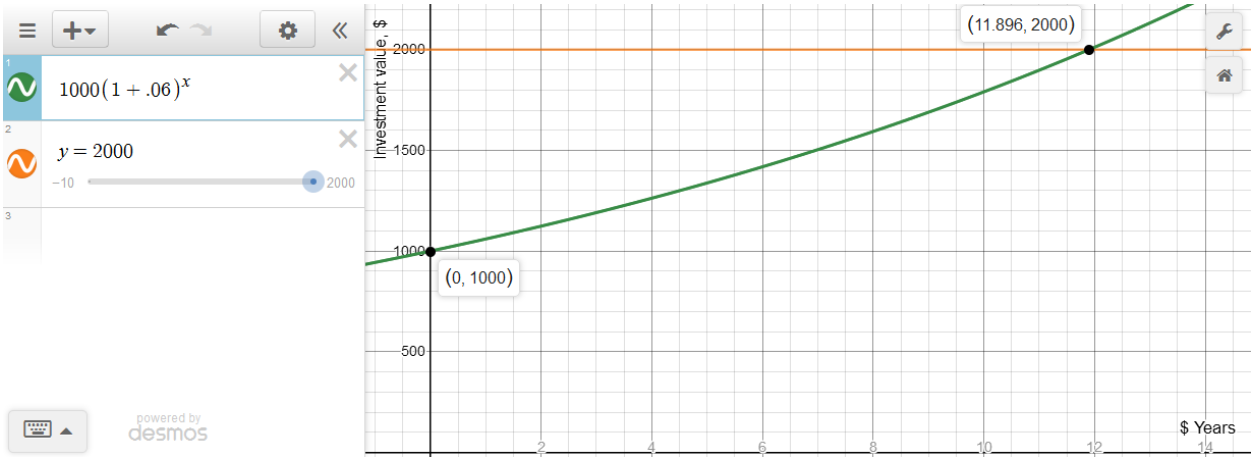
If P dollars are invested at an interest rate r per year, compounded annually, the future value S at the end of t years is

$$S = P(1 + r)^t$$

Let's look at the graph of the function that represents how long it takes \$100 to grow to \$200 at 6% compounded annually.



And here we grow \$1,000 to \$2,000 at 6% compounded annually.



In each case, the time it takes our initial investment to double when it is compounded annually is about 11.9 years. This will be true regardless of the value of the initial investment, P.

[1] Harshbarger/Yocco, *College Algebra In Context, 5e*, p. 385, #30.

b. *Compounded continuously.*

Here's the rule for this situation:

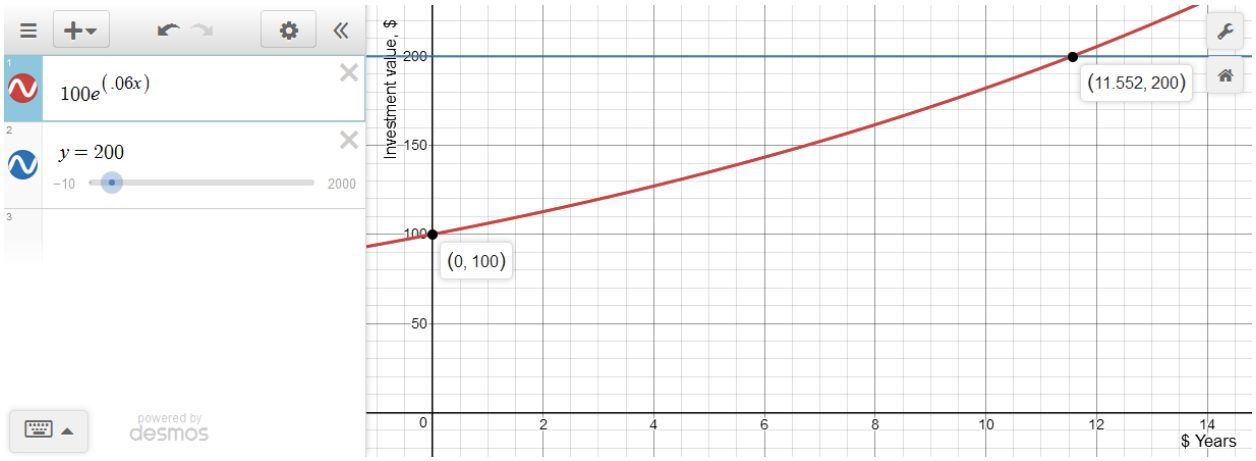
Future Value of an Investment with Continuous Compounding

If P dollars are invested for t years at an annual interest rate r, compounded continuously, then the future value S is given by

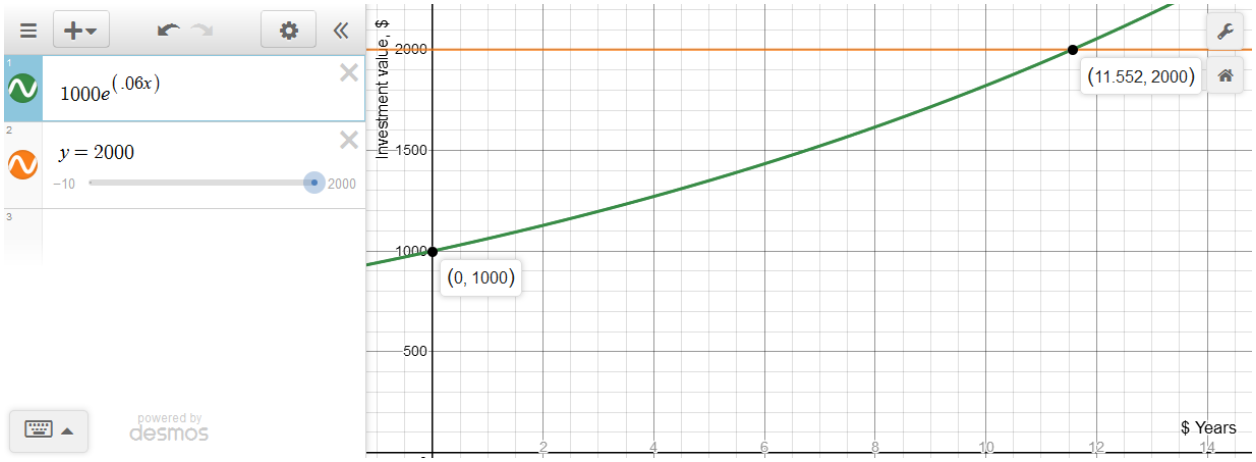
$$S = Pe^{rt} \text{ dollars}$$

Now let's look at the graph of the function that represents the future value, S, if P dollars are invested at 6% compounded continuously.

Remember, the goal is to estimate how long it will take this investment to double in value. We'll let $P = 100$ and see how long it takes this \$100 to grow to \$200.



And here we grow \$1,000 to \$2,000.



In each case, the time it takes our initial investment to double when it is compounded continuously is about 11.55 years. And this will be true regardless of the value of the initial investment, P.