CPSC203 WEEK-3 LAB-1
ANALYSIS AND FORECASTING

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COURSE WEBSITE

http://wiki.ucalgary.ca/page/Courses/Computer_Science/CPSC_203/CPSC_203_Template

INTRODUCTION

You will work through an example of applying Excel's forecasting features to perform a compound interest calculation. The compound interest is the amount of money earned on a deposit during a period of time. It can be calculated using the following formula:

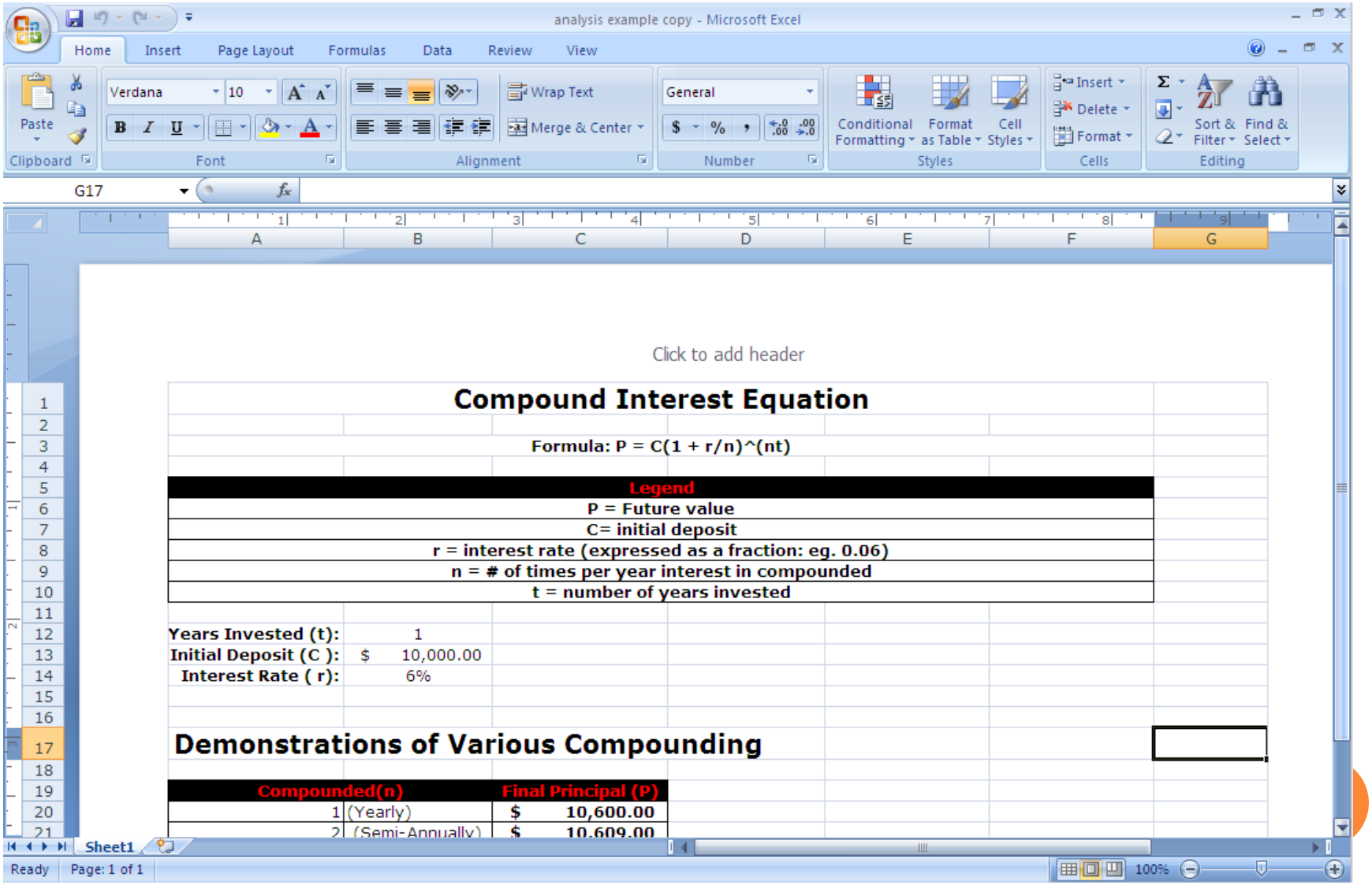
P= C (1 + r/n)^nt where

- P = future value
- C = initial deposit
- r = interest rate (expressed as a fraction e.g. 0.06 = 6%)
- n = # of times per year interest is compounded
- t = number of years invested.

FORECASTING

- You should setup your excel document so that it is easy to read and make modifications. Use the example layout as depicted below: This layout makes it easy to look up parts of the Compound Interest Formula as well as makes it easy to adjust the formula to try out new scenarios. Format your cells so that the correct number representation is shown, e.g. Initial Deposit is using the Currency Formatting while Interest Rate is using the Percentage Formatting.

FORECASTING



FORECASTING

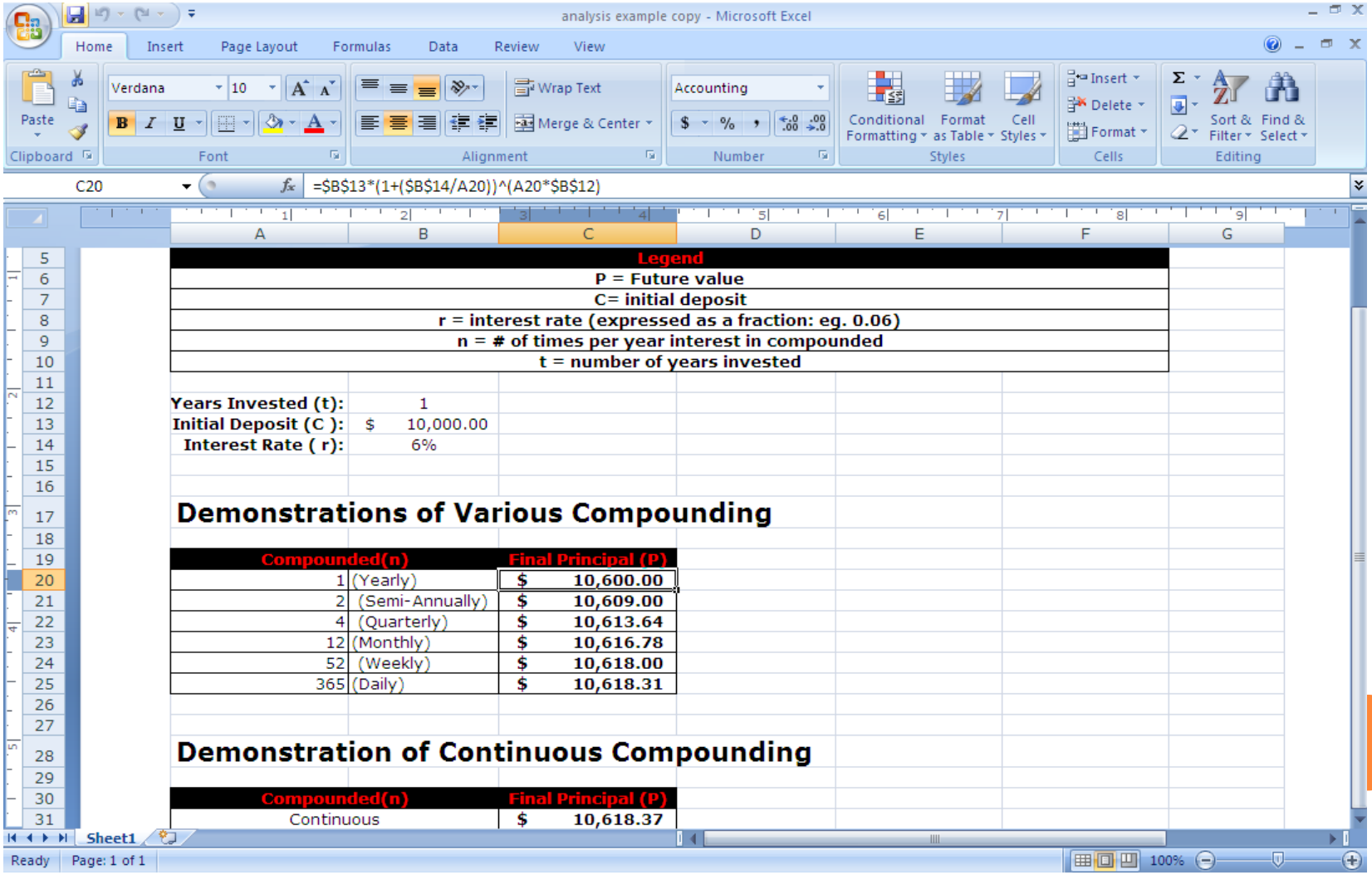
Create a legend for your formula, and the 3 sections for Years Invested, Initial Deposit, and Interest Rate. After words create a table that will display the compounded times available and the final principal which will tell you how much money you earn given the compound frequency and the interest rate available. We will determine the Final Principal using the formula stated above.

Demonstrations of Various Compounding

Compounded(n)		Final Principal (P)	
1	(Yearly)	$	10,600.00
2	(Semi-Annually)	$	10,609.00
4	(Quarterly)	$	10,613.64
12	(Monthly)	$	10,616.78
52	(Weekly)	$	10,618.00
365	(Daily)	$	10,618.31

FORECASTING

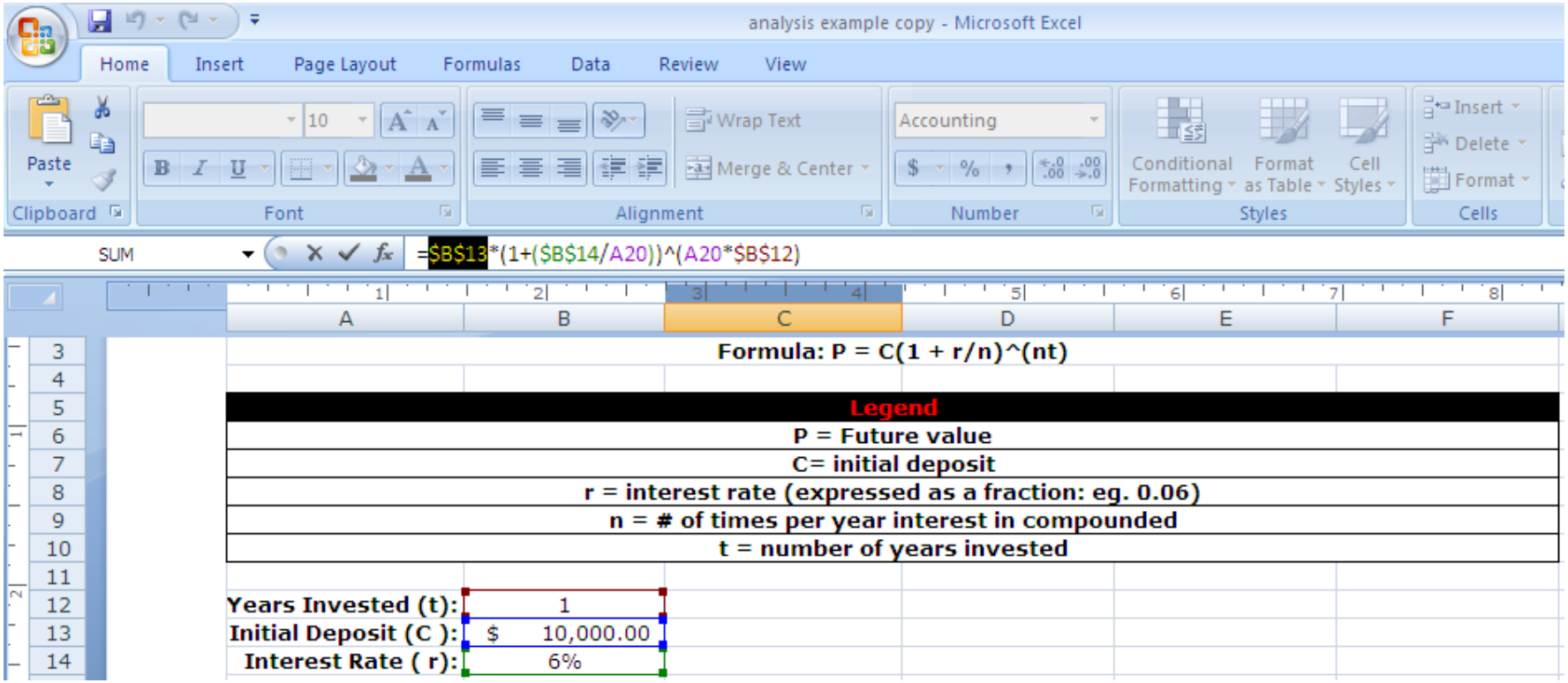
For the Final Principal field, you will notice the formula used in the formula bar. **=$B$13*(1+($B$14/A20))^(A20*$B$12)**
What do these values correspond to?



FORECASTING

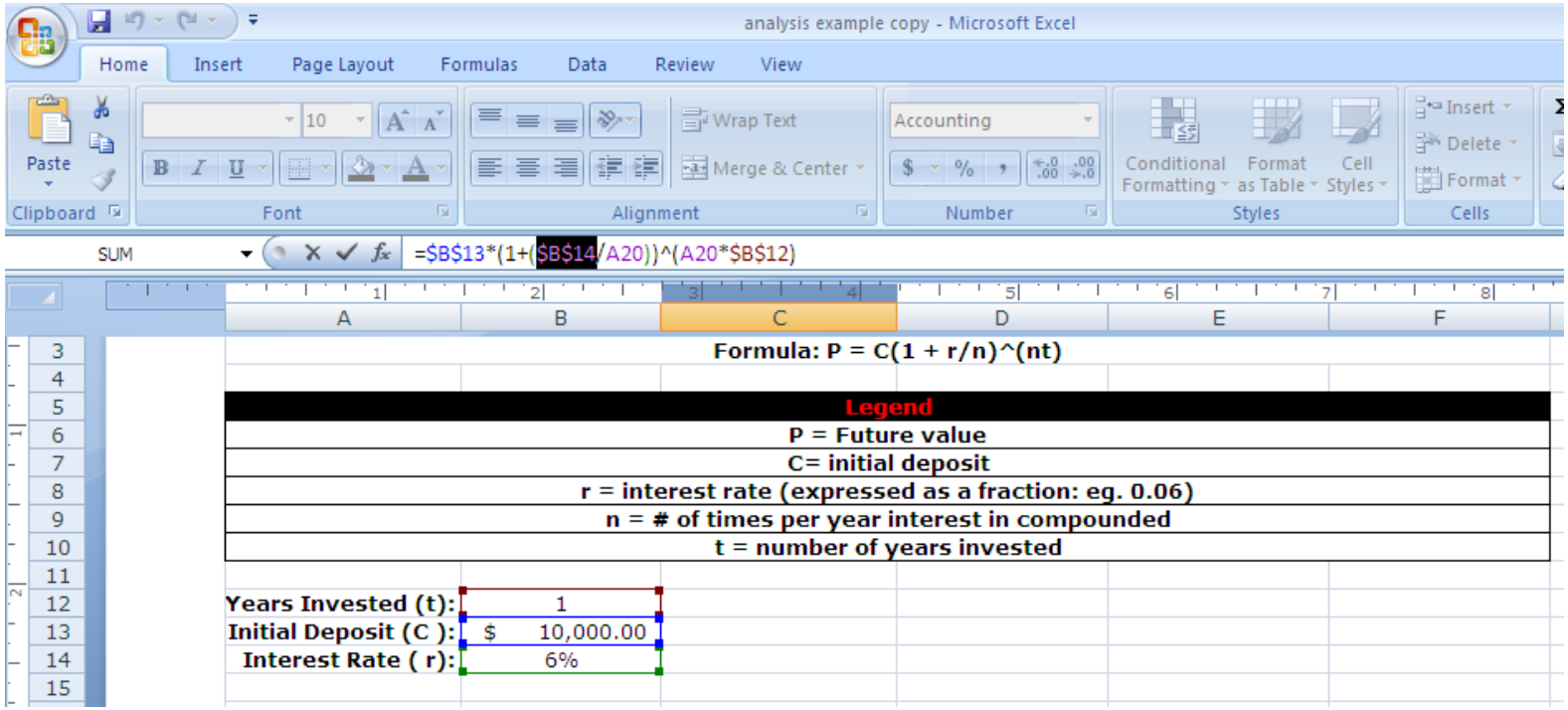
Let us take a step by step look at how this formula was created and what these values correspond to. As you can see in the picture depicted below, the highlighted $B$13 in the formula refers to cell B13 which is the value for Initial Deposit (C). The dollar signs ($) are used because we want to keep this cell constant where ever we use the formula, we always want it to refer to B13 to get the value for Initial Deposit. This also makes it easy for you to change the initial deposit amount and experiment will different values without having to modify lots of different cells.

FORECASTING



FORECASTING

Continuing on to the next variable in the formula, the highlighted $B$14 in the formula refers to cell B14 which is the value for the Interest Rate (r). Again the dollar signs ($) are used because we want to keep this cell constant where ever we use the formula.

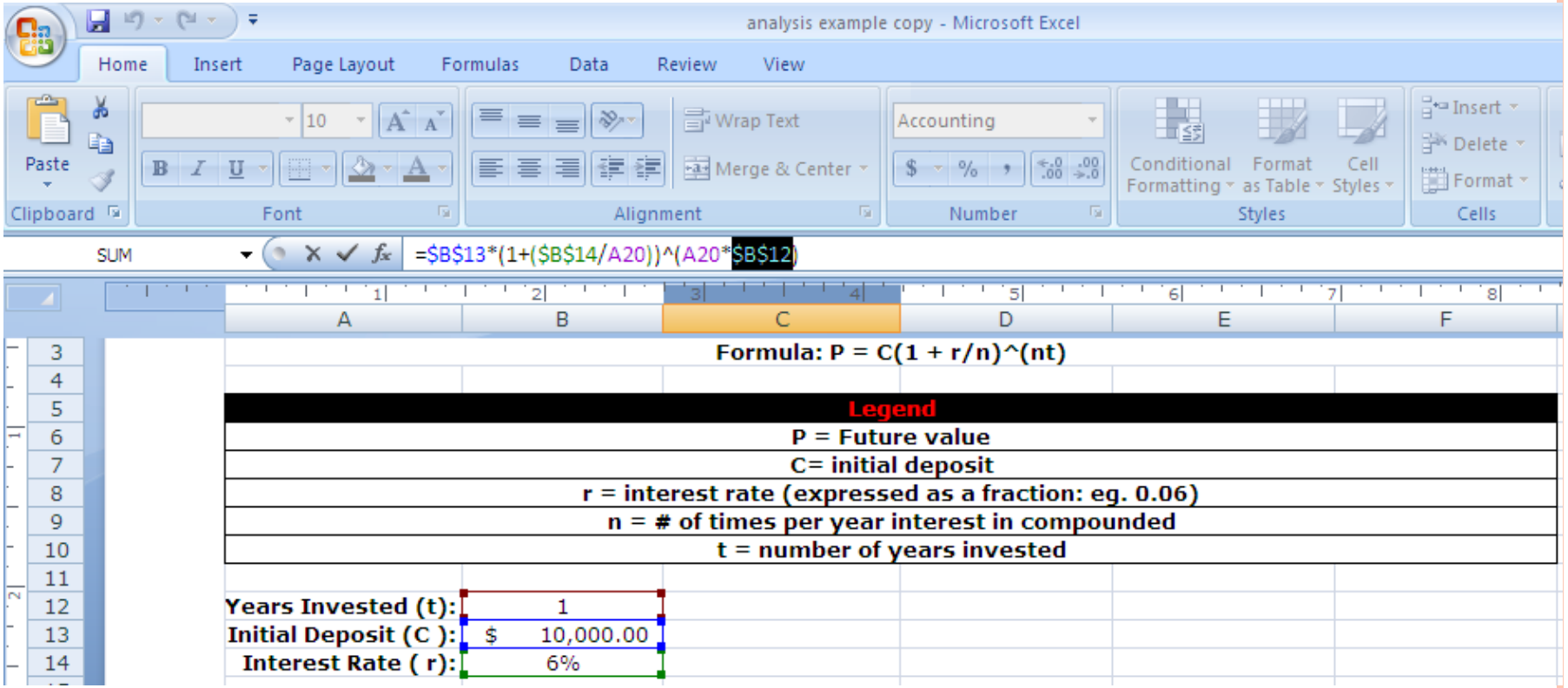


FORECASTING

Our last variable to examine in the formula for now is $B$12 which refers to cell B12 the number of years invested (t). Again the dollar signs ($) are used because we want to keep this cell constant where ever we use the formula.

It should start look more obvious that the formula in the formula bar is matching the one given earlier of **P = C(1 +r/n)^(nt).**

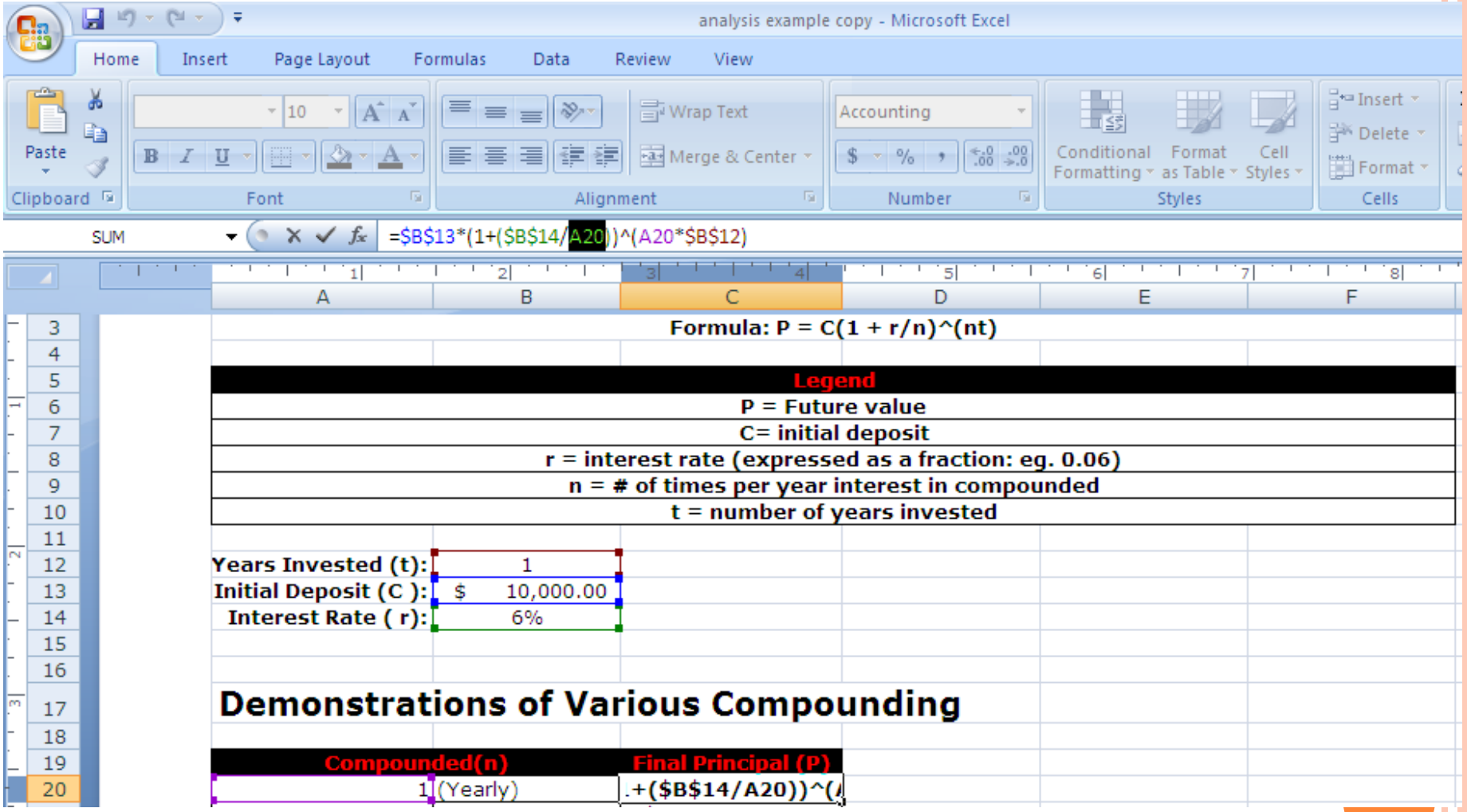
FORECASTING



FORECASTING

So that leaves us with A20 in the formula, A20 refers to the number of times per year that interest is compounded. Here we have created a table with lots of different options for compounding events which include: Yearly, Monthly, Quarterly, Daily, etc. NOTE: we refer to A20 which contains a number and not B21 as it just contains text. Our formula requires numbers to be used.

FORECASTING



FORECASTING

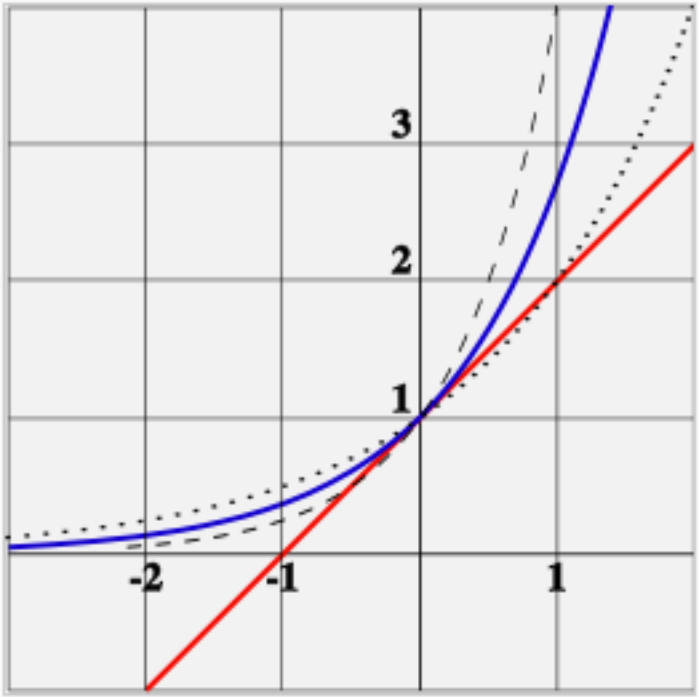
Looking at the next compounding event, Semi-Annually, you will see that in the formula A20 becomes A21. Meanwhile all the other variables in the formula have not changed because of course we are using the dollar signs ($) to keep those values constant. If you examine the remaining compounding events you will see the same thing occurring, A21 becomes A22, A22 becomes A23 to reflect the changing compounding event.

FORECASTING

So what about ***Continuous Compounding Interest?*** This type of calculation requires a slightly different but similar formula but is very simple for you to calculate. First we need to introduce the new formula and a new variable.

P = C e^(rt)

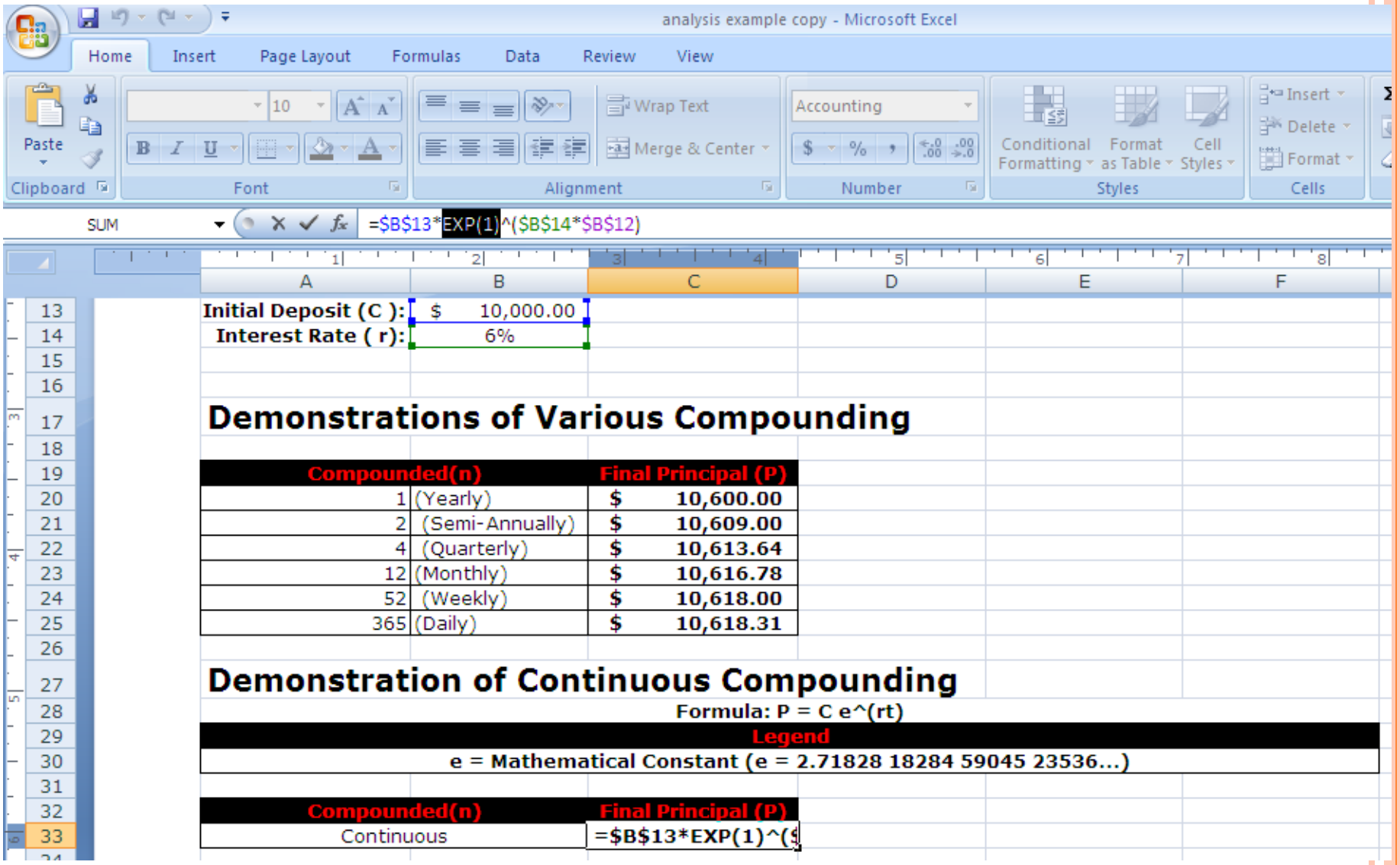
So the ***e*** variable, is a mathematical constant that is used for this formula, you can refer to it in calculation using **EXP(1)**.



e is the unique number *a*, such that the value of the derivative (the slope of the tangent line) of the exponential function $f(x) = a^x$ (blue curve) at the point $x = 0$ is exactly 1. For comparison, functions 2^x (dotted curve) and 4^x (dashed curve) are shown; they are not tangent to the line of slope 1 (red).

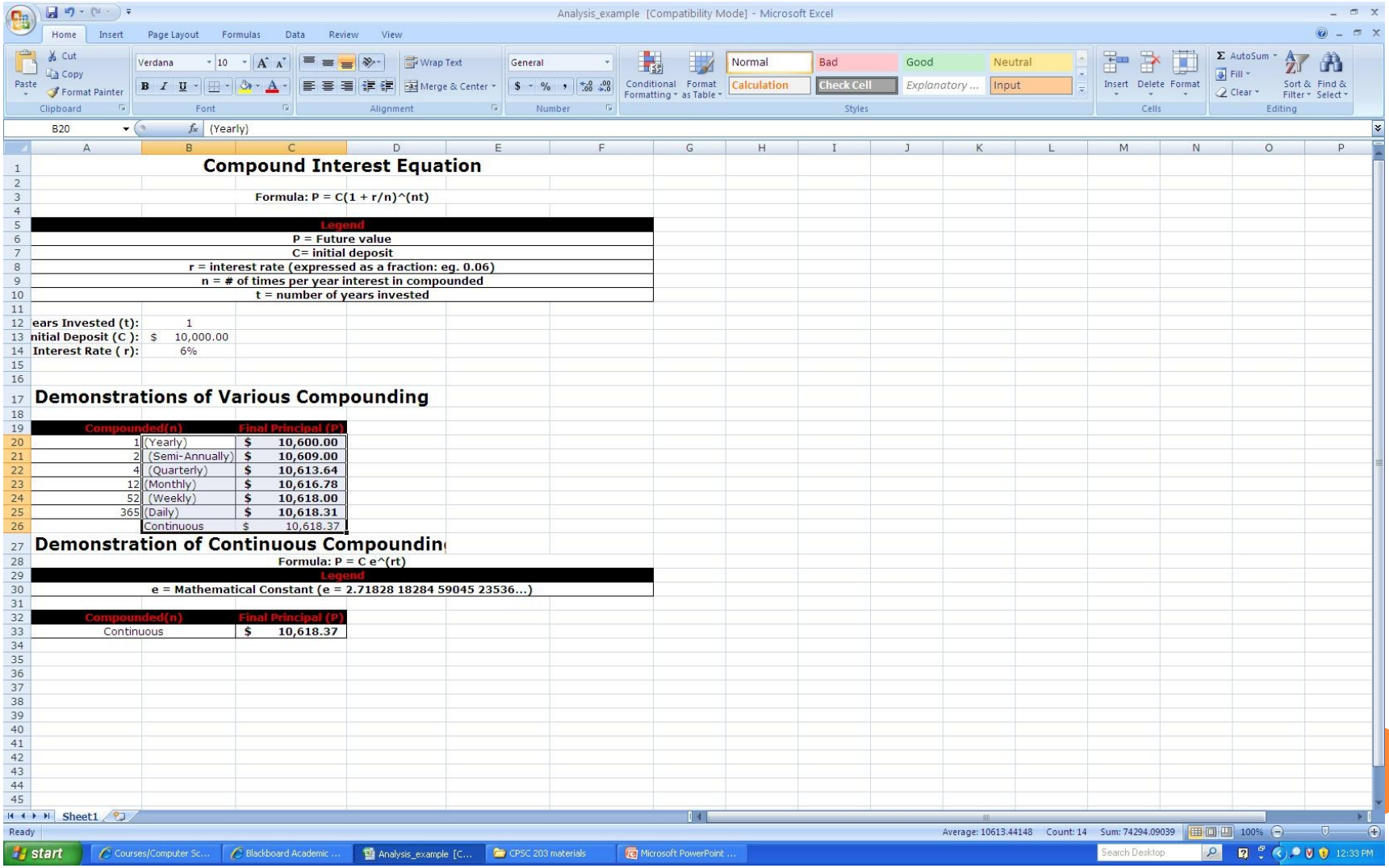
FORECASTING

So here is the e mathematical constant variable used in the formula.



FORECASTING

Make a chart with this compound interest values:



Analysis_example [Compatibility Mode] - Microsoft Excel

Compound Interest Equation			
Formula: P = C(1 + r/n)^(nt)			
Legend			
P = Future value			
C= initial deposit			
r = interest rate (expressed as a fraction: eg. 0.06)			
n = # of times per year interest in compounded			
t = number of years invested			
ears Invested (t):	1		
nitial Deposit (C):	$ 10,000.00		
Interest Rate (r):	6%		
Demonstrations of Various Compounding			
Compounded(n)		**Final Principal (P)**	
1	(Yearly)	$ 10,600.00	
2	(Semi-Annually)	$ 10,609.00	
4	(Quarterly)	$ 10,613.64	
12	(Monthly)	$ 10,616.78	
52	(Weekly)	$ 10,618.00	
365	(Daily)	$ 10,618.31	
	Continuous	$ 10,618.37	
Demonstration of Continuous Compoundin			
Formula: P = C e^(rt)			
Legend			
e = Mathematical Constant (e = 2.71828 18284 59045 23536...)			
Compounded(n)		**Final Principal (P)**	
Continuous		$ 10,618.37	

Sheet1

Ready

Average: 10613.44148 Count: 14 Sum: 74294.09039 100%

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FORECASTING

Make a chart with this compound interest values: