

ALGEBRA II ACTIVITY 9: GEOMETRIC SEQUENCES AND SERIES Tlalgebra.com

 ACTIVITY OVERVIEW: In this activity we will Examine geometric sequences and series in Sequence mode Relate geometric sequences to their explicit forms Find the partial sums of a sequence in a table Determine if a geometric series is converging 	NURMAL SCI ENG FLOAT 0123456789 RADIAN DEGREE FUNC PAR POL <u>SED</u> CONNECTED DOT Sequential Simul REAL a+Di re^0i FULL HORIZ G-T SET CLOCK <mark>03/19/07 6:44PM</mark>
Press MODE. Change the fourth line to SEQ for sequence mode as shown above. Press Y=. You will notice that the screen looks vastly different than when it is in function mode. You have the capability to define 3 sequences, u , v , and w .	Plot1 Plot2 Plot3 nMin=1 u(n)=1 u(nMin)= v(n)= v(nMin)= w(n)= w(nMin)=
Consider the sequence where $a_1=1$ and $a_n=2^*a_{n-1}$. To enter this sequence and generate a table of values. <i>n</i> Min will be 1 because the subscript of our initial term is a_1 . The u (<i>n</i>) notation replaces the a_n notation. Define u (<i>n</i>) as shown. Set u (<i>n</i> Min) as 1 because $a_1=1$. *Note: the braces will appear after you press enter if you choose not to type them.	Plot1 Plot2 Plot3 nMin=1 >u(n)■2*u(n-1) u(nMin)■(1) >v(n)= v(nMin)= >w(n)= w(nMin)=
Press 2nd GRAPH to view the table. What appears to be happening in this pattern? Is the value of each term increasing at a constant rate, a slowing rate or an increasing rate? What function produces the same table?	n u(n) 1 1 2 2 3 4 4 8 5 16 64 n=7
A sum of terms in a <i>sequence</i> is a <i>series</i> . Next you will ask the calculator to find the partial sums of the terms in the sequence $\mathbf{u}(n)$. This will be defined like a sequence where the sum for the <i>n</i> th term, $\mathbf{v}(n)$, is the sum for the previous term, $\mathbf{v}(n-1)$, plus the next term in the sequence $\mathbf{u}(n)$, which is $2^*\mathbf{u}(n-1)$. Define as shown.	Plot1 Plot2 Plot3 nMin=1 u(n)=2*u(n-1) u(nMin)=(1) v(n)=v(n-1)+2*u (n-1) v(nMin)=(1) vw(n)=

Press [2nd]GRAPH] to view the table. What is the relationship between the values in u(<i>n</i>) and v(<i>n</i>) . What is the sum of the first six terms?	$\begin{array}{c c c} n & u(n) & v(n) \\ \hline 0 & ERROR & ERROR \\ 1 & 1 & 1 \\ 2 & 2 & 3 \\ 3 & 4 & 7 \\ 4 & 8 & 15 \\ 5 & 16 & 31 \\ 6 & 32 & 63 \\ n=0 \end{array}$
Scroll down in the table. Do you notice anything more about the sum in column v(<i>n</i>) ? Does it appear to be stabilizing?	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
Consider the sequence where $a_1=5$ and $a_n=0.1^*a_{n-1}$. To enter this sequence and generate a table of values. <i>n</i>Min will be 1 because our initial term is a_1 . The u (<i>n</i>) notation replaces the a_n notation. Define u (<i>n</i>) as shown. Set u (<i>n</i> Min) as 5 because $a_1=5$.	Ploti Plot2 Plot3 nMin=1 ∿u(n)80.1*u(n-1) u(nMin)8(5) ∿v(n)= v(nMin)= ∿w(n)=
Press 2nd GRAPH to view the table. What appears to be happening in this pattern? Is the value of each term decreasing at a constant rate, a slowing rate or an increasing rate? What function produces the same table?	n u(n) 5 2 .5 3 .05 4 .005 5 .5 5 .5 7 .5
Find the sum of the terms in the sequence u (<i>n</i>). This will be defined like a sequence where the sum for the <i>n</i> th term is the sum for the previous term, v (<i>n</i> -1), plus the next term in the sequence u (<i>n</i>). Define as shown.	Ploti Plot2 Plot3 Nu(n)80.1*u(n-1) U(nMin)8(5) Nu(n)8v(n-1)+0.1 *u(n-1) V(nMin)8(5) Nw(n)=8
Press $2nd$ GRAPH to view the table. What is the relationship between the values in u (<i>n</i>) and v (<i>n</i>). What is the sum of the first six terms? Do you notice anything more about the sum in column v (<i>n</i>)? Does it appear to be <i>converging</i> ? That is, does it appear to be approaching a value that it will never exceed?	$\begin{array}{c c c c c c c c c c c c c c c c c c c $

Return to $Y=$. Arrow on top of the equals sign after $u(n)$. Press ENTER to turn the sign off so that when you graph you will only be graphing the sums from $v(n)$.	Plot1 Plot2 Plot3 nMin=1 hu(n)=0.1*u(n-1) u(nMin)=(5) hv(n)=v(n-1)+0.1 *u(n-1) v(nMin)=(5)
Press <u>WINDOW</u> . Arrow down to set the Xmin , Xmax , Ymin , and Ymax as shown.	WINDOW ↑PlotStep=1 Xmin=0 Xmax=10 Xscl=1 Ymin=3 Ymax=7 Yscl=1
Press GRAPH and TRACE. What is happening to the sum as <i>n</i> increases? Is there a value that the sum will never reach?	γ=γ(n−1)+0.1*u(n−1)
Investigate other series. When do series continue to take on larger and larger values, and when do series <i>converge</i> ?	· · ››=9 X=9Y=5.5555556 .