2. The drama club will give one performance every night except Sunday and Monday for two weeks (ten nights). Club members believe that revenue from the first night's production will be approximately $3500. For each night after that, they think the revenue will be 70% of the previous night's revenue. Use this information to estimate projected revenue for each of the first five nights of the production. Then write a function rule that models this situation.

1st night = 3500
2nd night = 3500(0.7) = 2450
3rd night = 2450(0.7)= 1715
4th night = 1715(0.7)= 1200.50
5th night = 1200.50(0.7)= 840.35

Answer SAS3 - problem #2

Below are some possible "rules" to model this situation

Explicit Formula	Recursive Formula	Exponential Function
$t_n = 3500(.7)^{n-1}$	$t_1 = 3500$ $t_n = (t_{n-1})(.70)$	$y = a\cdot b^x$ $y = a\cdot(.7)^x$ $(1, 3500)$ $3500 = a(.7)$ $\frac{3500}{.7} = a$ $5000 = a$ $y = 5000(.7)^x$

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both panels

2. The drama club will give one performance every night except Sunday and Monday for two weeks (ten nights). Club members believe that revenue from the first night's production will be approximately $3500. For each night after that, they think the revenue will be 70% of the previous night's revenue.

What is the total revenue for all 10 nights?

1	2	3	4	5	6	7	8	9	10
3500 +	2450 +	1715 +	1200.50 +	840.35 +	588.25 +	411.77 +	288.24 +	201.77 +	141.24

= $11,337.12

The sum of the first 10 nights of revenue creates a GEOMETRIC Series.

Geometric Series:

The sum of the terms of a Geometric Sequence

Revenues for all 10 nights.

3500 + 2450 + 1715 + 1200.50 + 840.35 + 588.25 + 411.77 + 288.24 + 201.77 + 141.24

Write this series in sigma notation

$$\sum_{n=1}^{10} \underbrace{3500(.7)^{n-1}}_{\text{explicit formula}}$$

Total revenue for all 10 nights.

$$\overset{t_1}{3500} + \overset{t_2}{2450} + 1715 + 1200.50 + 840.35 + 588.25 + 411.77 + 288.24 + \overset{t_9}{201.77} + \overset{t_{10}}{141.24}$$

Can you use the same process to find the sum of the terms of a Geometric Series as you did for an Arithmetic Series?

NO $t_1 + t_{10} \neq t_2 + t_9$

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all panels

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Sum of "n" terms of an Arithmetic Series:	Sum of "n" terms of a Geometric Series:
$S_n = \frac{n}{2}[t_1 + t_n]$	$S_n = t_1\left(\frac{1 - r^n}{1 - r}\right)$
What do you need to know to use this formula?	What do you need to know to use this formula?
• n = # of terms • t_1 = 1st term • t_n = Last term	• n = # of terms • t_1 = 1st term • r = the common ratio

Geometric Sequences:

Explicit Formula: $t_n = t_1 (r)^{n-1}$

Recursive Formula:

t_1 = first term

$t_n = t_{n-1} \bullet r$

Arithmetic Series:

Sigma Notation: $\sum_{n=1}^{n} t_1(r)^{n-1}$

if this is the explicit formula then n will start at 1 and stop at the # of terms

Sum of n terms: $S_n = t_1\left(\frac{1-r^n}{1-r}\right)$

$$S_n = t_1\left(\frac{1-r^n}{1-r}\right)$$

Find the sum of the first 10 terms of the sequence defined by this formula:

$t_n = 3(2)^{n-1}$

$$3\left(\frac{1-2^{10}}{1-2}\right) = 3(1-2^{10})/-1$$

$$= \boxed{3069}$$

2 + 6 + 18 + 54 + 162 + 486 + 1458 + 4374 + 13122

1. Write this series in sigma notation.

$$\boxed{\sum_{n=1}^{9} 2(3)^{n-1}}$$

Geometric $r=3$

explicit formula: $t_n = 2(3)^{n-1}$

Terms ⇒ $n=9$

2. Evaluate your answer to previous problem.

Sum of Geo Series: $S_n = t_1\left(\frac{1-r^n}{1-r}\right)$

$$S_9 = 2\left(\frac{1-3^9}{1-3}\right)$$

$$\boxed{S_9 = 19{,}682}$$

Find the sum of this series.

6 + 12 + 24 + 48 + ... + 384

Geo: $t_1 = 6$, $r = 2$

find # Terms:

$t_n = 6(2)^{n-1}$

$\frac{384}{6} = \frac{6(2)^{n-1}}{6}$

$64 = 2^{n-1}$

$64 = 2^6$ > $n-1=6$

$n=7$

$S_n = t_1\left(\frac{1-r^n}{1-r}\right)$

$S_7 = 6\left(\frac{1-2^7}{1-2}\right)$

$$\boxed{S_7 = 762}$$

Evaluate. $\sum_{n=1}^{7} 256(0.5)^{x-1}$

Geometric Series

$n = 7$ $t_1 = 256$ $r = 0.5$

$S_n = t_1\left(\frac{1-r^n}{1-r}\right) \Rightarrow S_7 = 256\left(\frac{1-.5^7}{1-.5}\right)$

$S_7 = 508$

Hwk #6:

1. PRACTICE SHEET Due Monday

2. Agile Mind website:
Topic 1: Arithmetic and Geometric Sequences and Series
More Practice pages 6-8