Assignment #15Advanced Algebra

Unit 1: Sequences and Series Assignment #15 Review #2...grade for correctness at end of class.

1. Which of the following is the correct recursive formula for the relationship shown in the following table?

n	u_n
1	1
3	9
6	21
7	25

$\frac{9-1}{3-1}\ \frac{8}{2} = 4$ cd

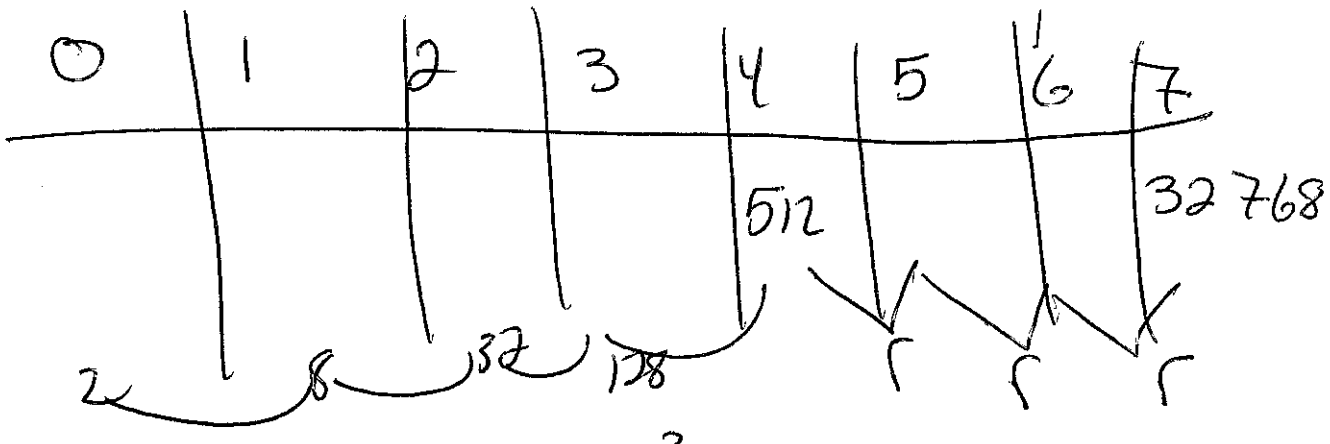
$U_1 = 1$

$U_n = U_{(n-1)} + 4$

$n \geq 2$

A.	B.	C.	D.
$\begin{cases} u_1 = 1 \\ u_n = u_{n-1} + 2 \\ n \geq 2 \end{cases}$	$\begin{cases} u_1 = 1 \\ u_n = u_{n-1} + 4 \\ n \geq 2 \end{cases}$	$\begin{cases} u_1 = 2 \\ u_n = u_{n-1} + 4 \\ n \geq 2 \end{cases}$	$\begin{cases} u_1 = 2 \\ u_n = u_{n-1} + 2 \\ n \geq 2 \end{cases}$

2) The following points are on the geometric curve $y = U_0 * r^x$. Write the equation of the curve for these 2 points. (4,512) (7,32768)



$512r^3 = 32768$

$r^3 = 64$

$r = 4$

now divide backwards to get to U_0

$y = 2 \cdot 4^x$

This is same concept as problem #2

3) Do the following points represent an arithmetic, geometric, or shifted geometric.

a) Write a recursive formula to represent the graph

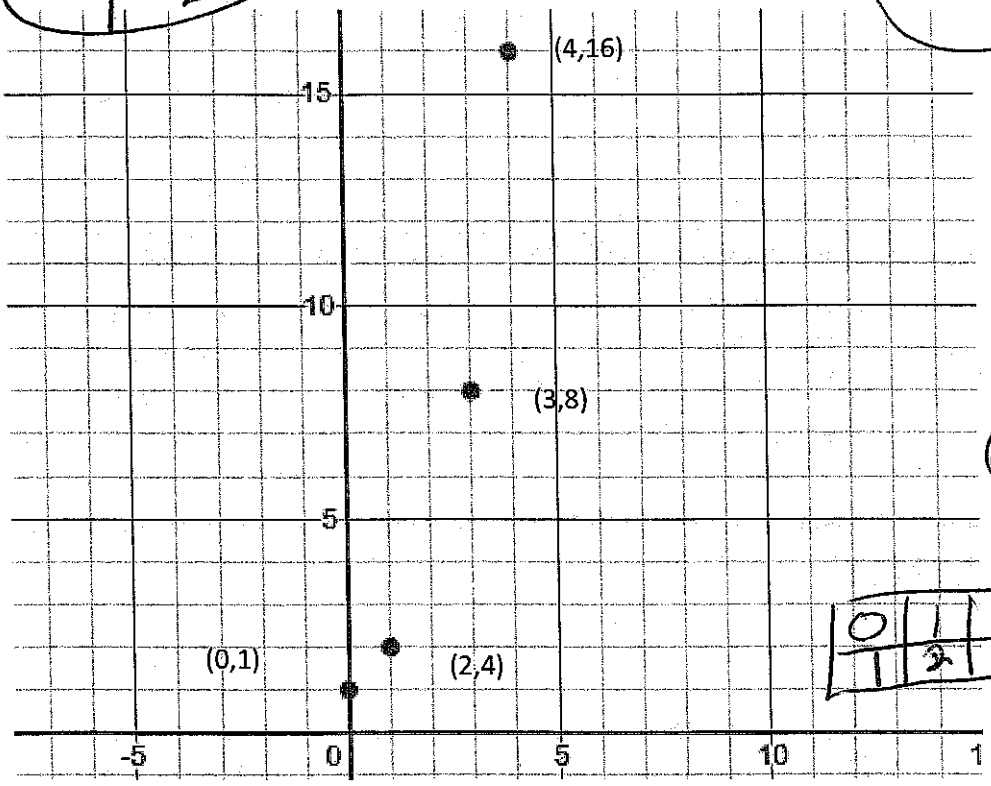
$U_0 = 1$

$U_n = 2 \cdot U_{(n-1)}$

$n \geq 1$

b) Write a direct formula to represent the graph.

$y = 2^x$



$4 \cdot r^x = 8$

$4 \cdot r^1 = 8$

$r = 2$

0	1	2	3	4
1	2	4	8	

×2

This is a Geometric Sequence

$r = 2$ and $U_0 = 1$

$y = 2^x$

4) Assume the sequence generated by $\begin{cases} u_0 = 800 \\ u_n = \left(1 + \frac{.164}{12}\right) u_{n-1} - 210 \\ n \geq 1 \end{cases}$ represents a loan, n is measured in months.

800 a) What is the initial amount borrowed?

$210 b) What is the deposit or payment amount?

16.4% c) What is the A.P.R.?

d) The A.P.R. is being compounded…

A.	B.	C.	D.
Weekly	Monthly	Quarterly	Yearly

5) What kind of sequence is y= 3*4^x

A.	B.	C.	D.
Geometric	Arithmetic	Shifted Geometric	Neither

6) What kind of sequence is y= 3x-5

A.	B.	C.	D.
Geometric	Arithmetic	Shifted Geometric	Neither

Assignment #15 Review #2

7) You take out a loan for $12,000. The APR is 6% compounded monthly.

a) Write the direct formula for this scenario

$$y = 12{,}000\left(1 + \frac{.06}{12}\right)^{x}$$

b) Assuming no payments are made, what will the balance be in 4 years?

Final answer

$$y = 12{,}000\left(1 + \frac{.06}{12}\right)^{48}$$

$15,245.87

$4 \times 12 = 48$ cycles

8) You take out a loan for $12,000. The APR is 6% compounded monthly. You also make $200 payments each month

a) Write the Shifted Geometric Sequence for this scenario.

$$U_0 = 12{,}000$$
$$U_n = \left(1 + \frac{.06}{12}\right) \cdot U_{(n-1)} - 200$$
$$n \geq 1$$

b) Use your calculator to find out how long it will take you to pay off the loan.

72 Months

71 | 102.25
72 | -97.24

71×200
1×102.25

or if you want to be more exact

$102.25\left(1 + \frac{.06}{12}\right)$

102.76

Final payment

c) How much did you pay in total?

Final Answer

$14,302.25

or

$14,297.76

Assignment #15 Review #2

High Challenge work (9% of test always)

1) Given the Shifted Geometric Sequence, find the direct formula.

$$\begin{cases} U0 = 19 \\ Un = 3 * U(n-1) - 25 \\ n \geq 1 \end{cases}$$

$y = A \cdot r^x + k$

$19 = A \cdot 3^0 + k$

$19 = A + k$

0, 19

1, 32

$32 = A \cdot 3^1 + k$

$32 = 3A + k$

$32 = 3A + k$

$-19 = -A - k$

$13 = 2A$

$A = 6.5$

$k = 12.5$

$y = 6.5(3)^x + 12.5$

2) The sum of the first 7 terms of an arithmetic sequence is 49. The sum of the first 40 terms of the same arithmetic sequence is 2260. (This will showcase your algebraic substitution skills)

$S_n = \frac{n(U_1 + U_n)}{2}$ you will also need $U_n = U_1 + (n-1)d$

$49 = \frac{7(U_1 + U_7)}{2}$

$14 = U_1 + U_1 + 6d$

$2260 = \frac{40(U_1 + U_{40})}{2}$

$113 = U_1 + U_1 + 39d$

$113 = 2U_1 + 39d$

What is U_1? -2

What is the direct formula for this arithmetic sequence?

$y = 3x - 5$

$14 = 2U_1 + 6d$

$-113 = -2U_1 - 39d$

$-99 = -33d$

$3 = d$

What is the sum of the first 100 terms?

Final answer

$\frac{100(-2 + 295)}{2}$ 14,650

3) What is the limit of the series 100+50+25+12.5+....

100, 50, 25, 12.5, 6.25, 3.125, 1.5625, .78125

$S_n = \frac{U_1(1 - r^n)}{(1 - r)}$

$U_1 = 50$

$S_{10} = \frac{50(1 - .5^{10})}{(1 - .5)} = 99.90$

$S_{30} = \frac{50(1 - .5^{30})}{(1 - .5)} = 99.999$

Basically the same value despite how many terms I use.

Final answer for #3

100