Name___________

Date___________

Advanced Algebra

Unit 1: Sequence and Series Assignment #12

**Find the partial sum of the given arithmetic sequence**

1) $\sum_{n=1}^{50} n$  $S_{50} = \frac{50(1+50)}{2}$  1275

2) $\sum_{n=1}^{100} 5n$  $S_{100} = \frac{100(5+500)}{2}$  25,250

Should be using the arithmetic sums formula Sn= $\frac{n(U_1+U_n)}{2}$

$\frac{100(1+100)}{2}$

3) $\sum_{n=51}^{100} n$  $\sum_{n=1}^{100} n - \sum_{n=1}^{50} = \sum_{n=51}^{100}$  $5050 - 1275 = \boxed{3775}$

Hint: To do this problem we need to find the sum of the first 50 terms. Then we need to find the sum of the first 100 terms. Then we can subtract our two answers and we will be left with the sum from 51-100. We can not do this problem directly….we need to do it in 2 parts.

4) $\sum_{n=1}^{20}(2n+1)$  $U_1 = 3$  $U_{20} = 41$  $S_{20} = \frac{20(3+41)}{2}$  $\boxed{440}$

The great thing about this notation is you have a direct formula. This means you can substitute directly into the given equation to find the first term and the 20th term.

**Write the arithmetic recursive formula for the given information:**

5) $U_1 = 5$ and d=6
6) $U_1=5$ and d= (-3/4)
7) $U_8 = 26$ and $U_{12} = 42$
8) $U_6 = -38$ and $U_{11} = -73$

Final answer should be in this form

$$\begin{cases} & U1 = \\ Un = & U(n-1)+? \\ & n \geq 2 \end{cases}$$

Final answer for #5

$U_1 = 5$
$U_n = 6 + U_{(n-1)}$
$n \geq 2$

OR $y = 6x - 1$

cd  $U_0$

Final answer for #6

$U_1 = 5$
$U_n = -\frac{3}{4} + U_{(n-1)}$
$n \geq 2$

OR $y = -\frac{3}{4}x + \frac{23}{4}$

cd  $U_0$

Final answer for #7

$y = 4x - 6$ OR

$U_1 = -2$
$U_n = U_{(n-1)} + 4$
$n \geq 2$

$\frac{42-26}{4} = 4$
$26 = U_1 + 7(4)$
$-2 = U_1$

Final answer for #8

$U_1 = -3$
$U_n = U_{(n-1)} - 7$  $n \geq 2$

$-38 = U_1 + 5(-7)$
$U_1 = -3$

$\frac{-73 - -38}{11-6}$  $\frac{-35}{5} = -7$

$\boxed{y = -7x + 4}$

**Limits another word for this is LONG RUN VALUE:** I can find any limit by clicking it out on my calculator. You can do this very fast. You do not need to count how many times you do it. You can also study the chart that we put in out notes.

9) $\begin{cases} U_0 = 126 \\ U_n = .825 * U_{(n-1)} + 18 \\ n \geq 1 \end{cases}$ 102.86

10) $\begin{cases} U_0 = 58 \\ U_n = 1.2 * U_{(n-1)} \\ n \geq 1 \end{cases}$ No Limit Geometric Increasing

11) How many different sequences can you make, now that you know about shifted geometric sequences if you are only given 2 numbers in the ordered list of numbers. For example, how many different sequences can you make given:

**10,8,...**

Infinite Amount

*So you need at least 3 numbers to define what type it is
here are some shifted example
$\begin{cases} 10 \times 5 + -42 \\ 10 \times 2 + -12 \\ 10 \times 1 - 2 \end{cases}$ you could do that forever

> Think about it....
>
> You could make one arithmetic as the common difference is -2
>
> You could make one geometric as the common ratio is 0.8
>
> How many shifted geometric could there be?

12) A new car costs $14,000. It has an annual depreciation of 13%. What is the car worth in 5 years?

Direct Equation

$y = 14{,}000(1 - .13)^x$

$14{,}000(1 - .13)^5$

Final Answer

$6,977.89

13) You deposit $1,000 into an account that earns 6% APR. You make no other deposits or withdraws. How much is the car worth in 8 years?

Direct Equation

$y = 1{,}000(1 + .06)^x$

$1000(1 + .06)^8$

Final Answer

$1593.85

14) You take out a loan of $11,000. The APR on this loan is 8% compounded monthly. You will make payments of $200 a month. How long does it take for you to pay off the loan? What is the last month's payment? What is the total amount that you paid?

Write the Shifted Geometric Sequence...it should look like the following.

$\begin{cases} U_0 = 11{,}000 \\ Un = (1 + \frac{.08}{12}) * U_{(n-1)} - 200 \\ n \geq 1 \end{cases}$

69 Total Months

68 | 147.52
69 | -51.5

Total paid
68 x 200
1 x 147.52
$13,747.5

**I can write an explicit ( direct) formula for an arithmetic or geometric recursive...**

A direct Arithmetic is

$Y=mx+U_0$

So you just need to go back and find $U_0$. It is the same thing as the y intercept

15) What is the direct formula for the arithmetic recursive:

$$\begin{cases} U_1 = 28 \\ U_n = U_{(n-1)} - 16 \\ n \geq 1 \end{cases}$$

Use your direct formula to find the 12th term: $y = -16x + 44$

$y = -16(12) + 44$ $-148$

16) What is the direct formula for the geometric recursive:

$$\begin{cases} U_0 = 5 \\ U_n = 4 * U_{(n-1)} \\ n \geq 1 \end{cases}$$

A direct Geometric is

$y=U_0*r^x$

Use your direct formula to find the 12th term: $y = 5(4)^x$

$y = 5(4)^{12}$

83,886,080

17) Joe bought a car for \$13,000. The depreciation rate is 12%. Write a recursive formula for this and a direct formula for this scenario. Use your direct formula to find the value of the car after 12 years.__________ \$2,803.73

$y = 13{,}000(1 - .12)^x$

$13{,}000(1 - .12)^{12}$

18) Given the series 5+9+13+17+...33 What is the sum of this given series?

$d=4$

$33 = 5 + (n-1)4$

$7 = n - 1$

$8 = n$

$S_8 = \frac{8(5+33)}{2}$ $152$

** 19) Given the series 4+16+64+...4096 What is the sum of this given series? Good problem for Geometric

Common Ratio is x4

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

$y = 4(4)^x$

$4096 = 4 \cdot 4^x$

$1024 = 4^x$

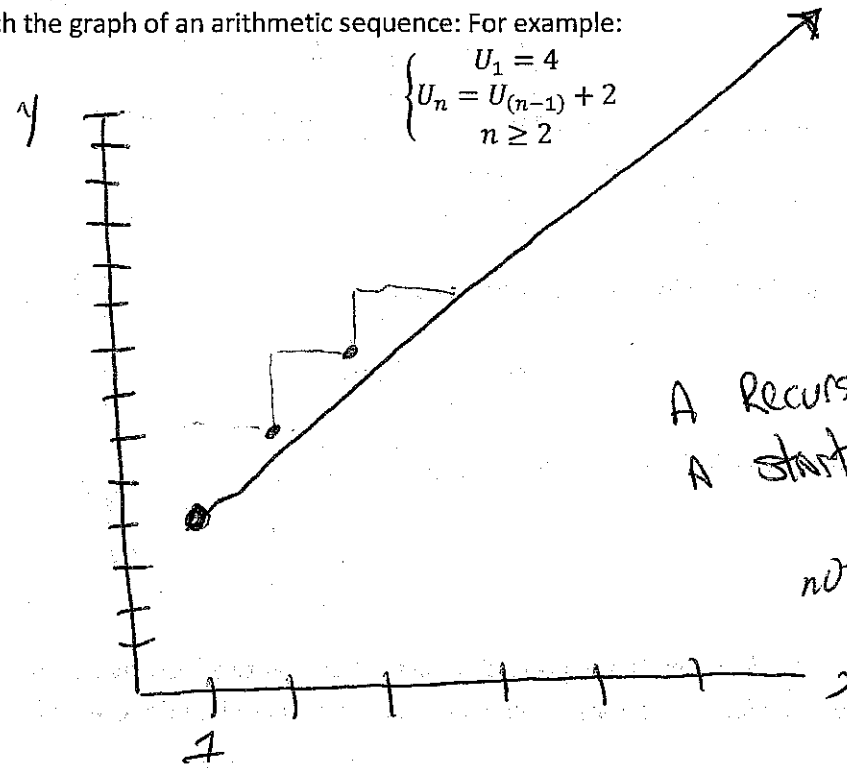
$x = 5$

$S_5 = \frac{16(1-4^5)}{(1-4)}$

$5456$

20) Sketch the graph of an arithmetic sequence: For example:

$$\begin{cases} U_1 = 4 \\ U_n = U_{(n-1)} + 2 \\ n \geq 2 \end{cases}$$




A Recursive graph has a starting point it is not the whole graph of $y = mx + b$

21) Sketch the graph of a geometric sequence: For example

$$\begin{cases} U_0 = 4 \\ U_n = 2 * U_{(n-1)} \\ n \geq 1 \end{cases}$$