Questions over 8.1?

99.

$3 - 9 + 27 - 81 + 243 - 729$

$3^1 \quad 3^2 \quad 3^3 \quad 3^4 \quad 3^5 \quad 3^6$

$\sum_{n=1}^{6} (-1)^{n+1} 3^n = -546$

Mar 31-5:51 PM

8.2: Arithmetic Sequences and Series

Review

Recall that a sequence that is defined **recursively** is a sequence where each term is dependent on the one(s) before it. Such as:

$$a_1 = 2;\ a_{n+1} = a_n + 3.$$

Example 1
List the first 5 terms of the above recursive sequence.

2, 5, 8, 11, 14

Apr 17-10:32 AM

Arithmetic Sequences

The previous example is called an **arithmetic sequence**, which is a sequence such that each term after the first is found by adding the same number to the preceding term. The number that is added each time is called the **common difference** and is typically denoted by *d*.

Q: What was the common difference, *d*, for Example 1?
A:

$d = 3$

Apr 17-10:33 AM

Example 2
For each of the following arithmetic sequences, identify the first term, a_1, and the common difference, *d*.

[A] 5,7,9,11,13,… $a_1 = 5 \quad d = 2$

[B] 2,1,0,−1,−2,… $a_1 = 2 \quad d = -1$

[C] $1, \frac{17}{16}, \frac{9}{8}, \frac{19}{16}, \frac{5}{4}, \ldots$ $a_1 = 1 \quad d = \frac{1}{16}$

p. 598, #1-7 (odd) (HW)

Apr 17-10:35 AM

Thus, in general, arithmetic sequences with a common difference *d* take the form:

$a_{n+1}=$ $a_n + d$

a_1

$a_2= a_1 + d$

$a_3= a_1 + 2d$

$a_4= a_1 + 3d$

The *n*th term of an arithmetic sequence is given by $a_n=$ $a_1+(n-1)d$ for any integer $n \geq 1$.

Apr 17-10:35 AM

Example

Find a formula for a_n if $a_1=15$ and $d=4$.

$a_n = a_1 + (n-1)d$

$a_n = 15 + (n-1)(4)$

$a_n = 15 + 4n - 4$

$a_n = 4n + 11$

p. 598, #21 (HW)

Mar 31-5:57 PM

Example

Find a formula for a_n if $a_1=-4$ and $a_5=16$.

$a_5 = a_1 + 4d$

$16 = -4 + 4d$

$+4 \quad +4$

$\frac{20}{4} = \frac{4d}{4}$

$5 = d$

$d=5$

$a_n = a_1 + (n-1)d$

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

$a_n = -4 + 5n - 5$

$a_n = 5n - 9$

p. 598, #23 (HW)

Mar 31-5:58 PM

Example

Find a formula for a_n if $a_6=-38$ and $a_{11}=-73$.

$a_1=-3 \quad d=-7$

$a_n = a_1 + (n-1)d$

$a_{11} = a_6 + 5d$

$-73 = -38 + 5d$

$+38 \quad +38$

$-35 = 5d$

$-7 = d$

$-38 = a_1 + (6-1)(-7)$

$-38 = a_1 - 35$

$+35 \quad +35$

$-3 = a_1$

$a_n = -3 + (n-1)(-7)$

$a_n = -3 - 7n + 7$

$a_n = -7n + 4$

Mar 31-5:59 PM

HOMEWORK

...arithmetic=add.

8.2a (p. 598): 1-33 (odd)

Mar 31-6:02 PM

WARM UP

Recall the formula for finding the general term of an arithmetic sequence: a_n=_____.

Use this formula to work exercises 35-41 (odd); these are part of tonight's homework.

Apr 7-3:24 PM

Arithmetic Series

Q: What's a series?
A:

Two ways to notate a series:

Apr 17-10:42 AM

$$1+2+\ldots+49+50+51+52+\ldots99+100$$

p. 599, #57 (HW)

Apr 17-10:46 AM

Example

Find the sum of the first 65 terms of the arithmetic series

$$33+39+45+51+\ldots$$

p. 599, #63 (HW)

Apr 17-10:47 AM

Example

Find the sum of the arithmetic series $\sum_{i=1}^{10}(6i-4)$

p. 599, #73 (HW)

Apr 17-10:49 AM

Example

How many poles will be in a stack of telephone poles if there are 50 in the first layer, 49 in the second, and so on, with 6 in the top layer?

Apr 17-10:50 AM

HOMEWORK

...arithmetic=add.

8.2b (p. 598): 35-41 (odd), 57-73 (odd), 81, 83

Mar 31-6:02 PM

Apr 24-11:20 AM