4.5 #1-25 odd; #27-47 odd	solving exponential equations; solving logarithmic equations
4.6 #5,7,9,15,17	application problems with logs/exp functions
10.1 #7,9,23-31odd #59,63,67	find the general (nth) term of the sequence write sigma notation
10.2 #9,15,19,21,25,29, 35,37	arithmetic sequences and series
10.3 #15,19,21,25,35,37,43,45,49,57	geometric sequences and series
10.7 #1,7,21,27,31-39odd	binomial theorem

Quiz on log/exp equations & applications - this week Thurs? = solving log/exp eq. = applications = simple seq/series

Test #4 - Feb 6-8?? Monday

(special Math Lab on Monday)

Arithmetic Sequences/Series: 10.2

Definition: A sequence is arithmetic if there exists a number d, called the **common difference**, such that $a_{n+1} = a_n + d$ for any integer $n \geq 1$.

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

The **sum of the first n terms** of an arithmetic sequence is given by
$S_n = \frac{n}{2}(a_1 + a_n) = \sum_{i=1}^{n} a_i$

$\overline{11+7+3+} \ldots$

$S_{14} =$

$d=-4$; $n=14$; $a_1 = 11$

$a_{14} = 11 + (14-1)(-4)$

$= 11 - 13(4) = -41 = a_{14}$

$\frac{14}{2}(11+(-41))$

$= 7(-30) = \boxed{-210}$

$-8, -5, -2, 1, 4, \ldots$

common difference : $d = 3$

n^{th} term : $a_n = a_1 + (n-1)d$

$a_n = -8 + (n-1)(3) = -11 + 3n$

12^{th} term :

$a_{12} = -11 + 3(12) = \boxed{25}$

$7, 4, 1, \ldots$

find the 17^{th} term.

$a_{17} = 7 + (17-1)(-3)$

$= 7 - 16(3)$

$= 7 - 48 = \boxed{-41}$

34. $$\sum_{K=5}^{20} 8K = 40+48+56+\ldots+160$$

$n = 20-5+1$
$= 16$

$$S_n = \frac{n}{2}(a_1 + a_n)$$

$$S_{16} = \frac{16}{2}(40+160) = 8(200) = \boxed{1600}$$

$$\sum_{i=2}^{5} i = \underbrace{2+3+4+5}_{\text{4 terms}}$$

$(5-2)+1$

10.2

36. $\sum_{K=2}^{50}(2000-3k)$

$= 2000-3(2) + \ldots + 2000-3(50)$

$= 1994 + \ldots + 1850$

$S_{49} = \frac{49}{2}(1994+1850) = \boxed{94{,}178}$

Geometric Sequences/Series:

$\boxed{10.3}$

Definition: A sequence is geometric is there is a number r, called the **common ratio**, such that $\frac{\boldsymbol{a_{n+1}}}{\boldsymbol{a_n}} = \boldsymbol{r}$, or $a_{n+1} = a_n r$, for any integer $n \geq 1$.

The **nth term of a geometric sequence** is given by
$\boldsymbol{a_n = a_1 r^{n-1}}$, for any integer $n \geq 1$.

The **sum of the first n terms** of a geometric sequence is given by
$\boldsymbol{S_n = \frac{a_1(1-r^n)}{1-r}}$, for any $r \neq 1$.

When $|r| < 1$, the **limit or sum of an infinite geometric series** is given by
$$\boldsymbol{S_\infty = \frac{a_1}{1-r}}$$

$18, -6, 2, \frac{-2}{3}$

common ratio: $\boxed{\frac{-1}{3}} = \frac{-6}{18} = \frac{2}{-6} = \frac{-2/3}{2}$, etc.

$2, -10, +50, -250, \ldots$ $r = -5$

find the 9^{th} term:

$a_9 = (2)(-5)^{9-1} = 2(-5)^8 = \boxed{781{,}250}$

$16 - 8 + 4 - 2 + \ldots$

Find the sum of the first 10 terms.

$S_n = \frac{a_1(1-r^n)}{1-r}$

$S_{10} = \frac{16\left(1-\left(\frac{-1}{2}\right)^{10}\right)}{1-\left(\frac{-1}{2}\right)} = \boxed{\frac{341}{32}}$

$$\sum_{n=0}^{\infty}\left(\frac{1}{2}\right)^n = \left(\frac{1}{2}\right)^0 + \left(\frac{1}{2}\right)^1 + \left(\frac{1}{2}\right)^2 + \ldots$$

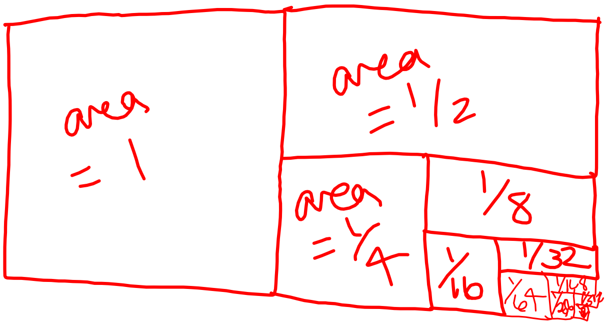
$$= 1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \ldots$$

$$S_\infty = \frac{1}{1-\frac{1}{2}} = \frac{1}{\frac{2}{2}-\frac{1}{2}} = \frac{1}{\left(\frac{1}{2}\right)} = 1\cdot\frac{2}{1} = \boxed{2}$$

$$\sum_{n=0}^{\infty}\frac{1}{2^n} = 1 + \frac{1}{2} + \frac{1}{4} + \ldots = 2$$

In general, when $|r| < 1$, the sum of an infinite geometric series is $S_\infty = \dfrac{a_1}{1-r}$

(or $S_\infty = \dfrac{a_0}{1-r}$ if series starts w/ a_0)



$$100 - 10 + 1 - \frac{1}{10} + \frac{1}{100} - \ldots$$

what is the sum of this infinite geometric series?

$$S_\infty = \frac{a_1}{1-r} = \frac{100}{1-\left(-\frac{1}{10}\right)} = \frac{100}{\frac{10}{10}+\frac{1}{10}} = \frac{100}{\left(\frac{11}{10}\right)}$$

$$= 100 \cdot \frac{10}{11} = \boxed{\frac{1000}{11}}$$

50. $\sum_{k=1}^{\infty} \frac{8}{3}\left(\frac{1}{2}\right)^{k-1}$

$= \frac{8}{3}\left(\frac{1}{2}\right)^{1-1} + \frac{8}{3}\left(\frac{1}{2}\right)^{2-1} + \left(\frac{8}{3}\right)\left(\frac{1}{2}\right)^{3-1} + \dots$

$= \frac{8}{3} + \frac{4}{3} + \frac{2}{3} + \dots \qquad r = \frac{1}{2}$

$S_\infty = \frac{8/3}{1-\left(\frac{1}{2}\right)} = \frac{8/3}{1/2} = \frac{8}{3} \cdot \frac{2}{1} = \boxed{\frac{16}{3}}$