The sum of a Finite Arithmetic Series:

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

Sum of the terms in a Finite Geometric Series

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

Sum of an Infinite Geometric Series

If |r|<1: $$S = \frac{a_1}{1 - r}$$

Bellwork Friday, June 6, 2014

Find the sum of each series.

1. 9 + 17 + 25 + 33 + ... + 185

$$S_n = \frac{23}{2}(9 + 185)$$
$$= 2231$$

$$a_n = a_1 + (n-1)d$$
$$185 = 9 + (n-1)8$$
$$n = 23$$

2. 0.125 + 0.5 + 2 + ... +33,554,432

$$r = 4$$

$$a_n = a_1(r)^{n-1}$$
$$33{,}554{,}432 = .125(4)^{n-1}$$
$$268435456 = 4^{n-1}$$

$$S_n = \frac{.125(1 - 4^{15})}{1 - 4}$$

$$\log_4 268435456 = n - 1$$
$$n = 15$$

$$= 44{,}739{,}242.625$$

3. 334,611 + 111,537 + 37,179 + ...

$$r = \frac{1}{3}$$

$$\frac{334{,}611}{1 - 1/3} = \frac{334{,}611}{2/3}$$

$$334611/(2/3)$$
or
$$334611 \cdot \frac{3}{2}$$

$$= \boxed{501{,}916.5}$$

Evaluate each.

3. $\sum_{n=1}^{5} 3n^2 + 1$

$\underline{4} + \underline{13} + \underline{28}$
$+ \underline{49} + \underline{76}$
$= 170$

4. $\sum_{n=1}^{40} 4n - 1$

$\underline{3} + \underline{7} + \underline{11} + \underline{\quad}$

$S_{40} = \frac{n}{2}(a_1 + a_n)$
$= \frac{40}{2}(3 + 159) = 3240$

5. $\sum_{n=1}^{12} 5(3)^n$

$a_1 = 15$
$r = 3$
$n = 12$

$\frac{15(1-3^{12})}{1-3} = 3,985,800$

6. $\sum_{n=1}^{\infty} 56(0.6)^n$

$r = .6$
$a_1 = 33.6$

$S = \frac{33.6}{1-.6} = 84$