1.1 ARITHMETIC SEQUENCES

2012-05-18

The GENERAL TERM of an arithmetic sequence is given by:

$$\boxed{t_n = a + (n-1)d}$$

a = the 1st term

n = the # of terms

d = the common difference

t_n = the general term / the last term

Arithmetic Sequences

3, 6, 9, 12, ... ✓

5, 10, 15 ... ✓

7, 5, 3, ... ✓

4, 5, 7, 10 ... ✗ Not arithmetic

① Given 2, 5, 8 ... determine each term:

a) t_n (general term)

$a = 2$

$d = 3$

$t_n = a + (n-1)d$

$t_n = 2 + (n-1)(3)$

$t_n = 2 + 3n - 3$

$\boxed{t_n = 3n - 1}$

b) t_{80} "a_{80}"

$t_n = 3n - 1$

$t_{80} = 3(80) - 1$

$t_{80} = 240 - 1$

$\boxed{t_{80} = 239}$

OR

$t_n = a + (n-1)d$

$t_{80} = 2 + (80-1)(3)$

$t_{80} = 2 + (79)(3)$

$t_{80} = 2 + 237$

$\boxed{t_{80} = 239}$

② Given 3, 5, 7 ... determine t_{75}.

$a = 3$

$d = 2$

$n = 75$

$t_n = a + (n-1)d$

$t_{75} = 3 + (75-1)(2)$

$= 3 + (74)(2)$

$= 3 + 148$

$\boxed{t_{75} = 151}$

(3) Given 14, 25, 36... one term in the sequence is 234. Which term is it?

$14, 25, 36 \ldots 234$
$1 \quad 2 \quad 3 \quad\quad (?)$

$a = 14$
$d = 11$
$t_n = 234$

$t_n = a + (n-1)d$

$234 = 14 + (n-1)(11)$

$\frac{220}{11} = \frac{(n-1)(11)}{11}$

$20 = n - 1$

$\boxed{21 = n}$

(4) Find the first term in an arithmetic sequence where the 5th term is 3 and the 25th term is −57.

$t_5 = 3 \quad t_n = a + (n-1)d \quad t_{25} = -57$

$3 = a + 4d$ (1)
$-\ \ -57 = a + 24d$ (2)

(1)−(2) $60 = -20d$

$\frac{60}{-20} = d$

$d = -3$

sub into (1) $3 = a + 4(-3)$

$3 = a - 12$

$\boxed{15 = a}$

(5) Find the first term in an arithmetic sequence where $t_{50} = 152$ and $t_{200} = 602$.

$152 = a + 49d$ (1)
$-\ \ 602 = a + 199d$ (2)

$-450 = -150d$

$d = \frac{-450}{-150}$

$d = 3$

sub into (1) $152 = a + 49(3)$

$152 = a + 147$

$\boxed{a = 5}$

(6) Determine the first four terms in the sequence $\left\{\frac{n+3}{n^2+1}\right\}$

$t_1 = \frac{1+3}{1^2+1} = \frac{4}{2} = 2$

$t_2 = \frac{2+3}{2^2+1} = \frac{5}{5} = 1$

$t_3 = \frac{3+3}{3^2+1} = \frac{6}{10} = \frac{3}{5}$

$t_4 = \frac{4+3}{4^2+1} = \frac{7}{17}$

7 Determine the value of x and a such that the following is an arithmetic sequence: (first term)

$$x+2,\ 3x-1,\ 2x+1$$

2nd Term − 1st Term = 3rd Term − 2nd Term.
(both equal d)

$$3x-1-(x+2) = 2x+1-(3x-1)$$
$$3x-1-x-2 = 2x+1-3x+1$$
$$2x-3 = -x+2$$
$$3x = 5$$
$$\boxed{x=\frac{5}{3}} \quad a = \frac{5}{3}+2 = \frac{5}{3}+\frac{6}{3} \quad \boxed{a=\frac{11}{3}}$$

Pg 9
* #2 (a, e)
* #8–11 (a, e)
* #14

$$t_n = a + (n-1)d$$
$$2x+1 = x+2+(2)(2x-3)$$
$$2x+1 = x+2+4x-6$$
$$2x+1 = 5x-4$$
$$5 = 3x$$
$$\frac{5}{3} = x$$

Note Title 2012-05-18

1.2 Arithmetic Series

Sequence: 3, 6, 9...

Series: 3+6+9+...

The sum of the first n terms of the general arithmetic series is:

$$\boxed{S_n = \frac{n}{2}(a + l)}$$

n = # of terms
a = first term
l = last term

OR

$$\boxed{S_n = \frac{n}{2}(2a + (n-1)d)}$$

n = # of terms
d = common difference
a = 1st term

① Determine the sum of the first 50 terms of the arithmetic series $3 + 4.5 + 6 + \ldots$

$n = 50$

$a = 3$

$d = 1.5$

$$S_n = \frac{n}{2}[2a + (n-1)d]$$

$$S_{50} = \frac{50}{2}[6 + (49)(1.5)]$$

$$S_{50} = 25[6 + 73.5] = \boxed{1987.5}$$

② Determine the sum given $1 + 5 + 9 + \ldots + 97$.

$a = 1$

$d = 4$

$t_n = l = 97$

1. Determine n

$t_n = a + (n-1)d$

$97 = 1 + (n-1)4$

$96 = 4n - 4$

$100 = 4n$

$n = 25$

2. Determine sum

$S_n = \frac{n}{2}(a + l)$

$S_{25} = \frac{25}{2}(1 + 97)$

$\boxed{S_{25} = 1225}$

③ Determine d if $S_7 = 91$ and $a = 19$.

$a = 19$
$n = 7$
$S_7 = 91$

$S_n = \frac{n}{2}[2a + (n-1)d]$

$91 = 3.5[38 + 6d]$

$\frac{91}{3.5} = 38 + 6d$

$26 = 38 + 6d$

$-12 = 6d$

$\boxed{d = -2}$

4 Determine the sum of $3+5+7+\dots+(2n+1)$

$a=3$
$d=2$
$l=2n+1$
$n=n$

$$S_n = \frac{n}{2}(a+l)$$
$$= \frac{n}{2}(3+2n+1)$$
$$= \frac{n}{2}\cdot\frac{(2n+4)}{1}$$
$$= \frac{2n^2+4n}{2} = \boxed{n^2+2n}$$

5 In an ice cream store, the sale of ice cream increases by \$5 per week during a 15 week season. Suppose the profit for the first week is \$30, determine the profit for the entire season.

$d=5$
$n=15$
$a=30$

$$S_n = \frac{n}{2}[2a+(n-1)d]$$
$$S_{15} = \frac{15}{2}[60+(14)(5)]$$
$$S_{15} = 7.5[60+70]$$
$$S_{15} = 7.5[130]$$
$$\boxed{S_{15} = \$975.^{00}}$$

5 Find two arithmetic means between 17 and 59.

17, __, __, 59

$t_4 = 59$
$a = 17$
$n = 4$

$$t_n = a+(n-1)d$$
$$59 = 17+(3)d$$
$$42 = 3d$$
$$d = 14$$

Arithmetic Means: $17+14=\boxed{31}+14=\boxed{45}$

Pg 16
#1 (b,c,e)
#2,4 (a,c,e)
9

1.3 Geometric Sequences

Note Title 2015-01-10

Sequences whose terms result from multiplying the previous term by a common ratio are called GEOMETRIC SEQUENCES

$$t_n = ar^{n-1}$$

a = 1st term
r = common ratio
n = # of terms
t_n = general term / last term

Ex $2, 4, 8, 16, 32, 64 \dots$

$r = \frac{4}{2} = \frac{8}{4} = \frac{t_{n+1}}{t_n}$

① Given $-999, -111, \frac{-37}{3} \dots$ find t_6

$t_n = ar^{n-1}$

$t_6 = (-999)\left(\frac{1}{9}\right)^5$

$t_6 = (-999)\left(\frac{1}{59049}\right)$

$$\boxed{t_6 = \frac{-37}{2187} \text{ OR } -0.017}$$

② Given $t_4 = 3$ and $t_8 = 243$ find t_{11} in a geometric sequence.

$t_n = ar^{n-1}$

$3 = ar^3$ ①

$243 = ar^7$ ②

② ÷ ①

$81 = r^4$

$r = \pm 3$

even exponent

$3 = a(\pm 3)^3$

$3 = a(\pm 27)$

$a = \frac{3}{\pm 27}$ $a = \pm\frac{1}{9}$

$t_{11} = \left(\pm\frac{1}{9}\right)(\pm 3)^{10}$

$t_{11} = \left(\pm\frac{1}{9}\right)(+59049)$

$\therefore \boxed{t_{11} = \pm 6561}$

(3) Given $t_3 = 59049$, $t_6 = 81$ in a geometric sequence find t_{10}.

$t_n = ar^{n-1}$

$59049 = ar^2$ (1)

$81 = ar^5$ (2)

(1) ÷ (2)

$729 = r^{-3}$

$\frac{1}{729} = r^3$

$\frac{1}{9} = r$

$81 = a\left(\frac{1}{9}\right)^5$

$81 = a\left(\frac{1}{59049}\right)$

$a = 4782969$

$t_{10} = (4782969)\left(\frac{1}{9}\right)^9$

$\boxed{t_{10} = \frac{1}{81} \text{ OR } 0.0123\ldots}$

(4) If $x-3$, $x+1$, $4x-2$ are consecutive terms of a geometric sequence, find x

$\frac{x+1}{x-3} = \frac{4x-2}{x+1}$ ← $\frac{2^{nd}\text{ term}}{1^{st}\text{ term}} = \frac{3^{rd}\text{ term}}{2^{nd}\text{ term}}$

$(4x-2)(x-3) = (x+1)(x+1)$

$4x^2 - 14x + 6 = x^2 + 2x + 1$

$3x^2 - 16x + 5 = 0$

$3x^2 - 15x - x + 5 = 0$

$3x(x-5) - 1(x-5) = 0$

$(3x-1)(x-5) = 0$

$\boxed{x = \frac{1}{3} \quad x = 5}$

Pg 22

#1, 2, 4 (a, c, e, g, i)

#7, 8

Note Title 2012-05-24

1.4 Geometric Series

$2+4+8+16+\dots$ is a geometric series

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

$$S_n = \frac{a-rl}{1-r}$$

* Use if you know the last term

l = last term

① Determine S_8, if $a=12$, $t_5=192$ (geometric series)

$t_n = ar^{n-1}$

$192 = 12r^4$

$16 = r^4$

$r = \pm 2$

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

$$S_8 = \frac{12(1-(\pm 2)^8)}{1-(\pm 2)}$$

$$S_8 = \frac{12(1-256)}{1-(\pm 2)}$$

$$= \frac{-3060}{-1} \text{ OR } \frac{-3060}{3}$$

$$= \boxed{3060 \text{ OR } -1020}$$

② Determine the sum of each geometric series

a) $\sum_{k=2}^{9} 18(0.1)^k$

$a = 18(0.1)^2 = \boxed{0.18}$

2^{nd} term $= 18(0.1)^3 = \boxed{0.018}$

$r = \frac{0.018}{0.18} = \boxed{0.1}$

$n = 9-2+1$

$\boxed{n=8}$

$l = 18(0.1)^9 \nearrow$ 1.8 $\boxed{EXP}$ -8

$\boxed{l = 1.8 \times 10^{-8}}$

$$S_n = \frac{a-rl}{1-r}$$

$$S_8 = \frac{0.18-(0.1)(1.8\times 10^{-8})}{1-0.1}$$

$$= \boxed{0.20}$$

b) $\sum_{k=0}^{9} \frac{3}{5^{k+1}}$

$a = \frac{3}{5} = 0.6$

2nd term: $\frac{3}{25} = 0.12$

$r = \frac{0.12}{0.6} = \frac{1}{5} = 0.2$

$n = 10$

$l = \frac{3}{5^{10}}$

$S_n = \frac{a - rl}{1-r}$

$S_{10} = \frac{0.6 - (0.2)\left(\frac{3}{5^{10}}\right)}{1 - 0.2}$

$\boxed{S_{10} = 0.75}$

③ Write the following using sigma notation

a) $8 + 4 + 2 + \ldots + \frac{1}{64}$

$\sum_{k=1}^{n} ar^{k-1} \rightarrow \sum_{k=1}^{n} (8)\left(\frac{1}{2}\right)^{k-1}$

$t_n = ar^{n-1}$

$\frac{1}{64} = 8\left(\frac{1}{2}\right)^{n-1}$

$\frac{1}{512} = \left(\frac{1}{2}\right)^{n-1}$

$\left(\frac{1}{2}\right)^9 = \left(\frac{1}{2}\right)^{n-1}$

$9 = n-1$

$n = 10$

$\boxed{\sum_{k=1}^{10} 8\left(\frac{1}{2}\right)^{k-1}}$

b) $-12 - 6 - 3 - \ldots - \frac{3}{16}$

$\sum_{k=1}^{n} (-12)\left(\frac{1}{2}\right)^{k-1}$

$t_n = ar^{n-1}$

$-\frac{3}{16} = (-12)\left(\frac{1}{2}\right)^{n-1}$

$\frac{1}{64} = \left(\frac{1}{2}\right)^{n-1}$

$\left(\frac{1}{2}\right)^6 = \left(\frac{1}{2}\right)^{n-1}$

$n = 7$

Pg 28
*1, 3, 4 (a, c, e)
5, 12

$\boxed{\sum_{k=1}^{7} (-12)\left(\frac{1}{2}\right)^{k-1}}$

Note Title 2012-05-29

1.5 Infinite Geometric Series

The sum of an infinite geometric series where

$-1 < r < 1$ or $|r| < 1$ is:

← "Absolute Value"

$$\boxed{S_\infty = \frac{a}{1-r}}$$

On Formula Sheet
(Series Converges / CONVERGENT)

* If r is NOT between -1 and 1,
NO FINITE SUM (Diverges / DIVERGENT)

① Determine the sum where a sum to infinity exists:

a) $15 - 9 + \frac{27}{5} - \ldots$

$r = -0.6$

$-1 < -0.6 < 1$ ✓ CONVERGENT

* Find the sum

$$\boxed{S = \frac{15}{1-(-0.6)} = 9.375}$$

b) $-4 + 6 - 9 + \ldots$

$r = \frac{6}{-4} = -1.5$ ✗ DIVERGENT

$$\boxed{\text{NO FINITE SUM / DIVERGENT}}$$

② Determine the sum

a) $\sum_{i=0}^{\infty} 2(0.9)^i$

$a = 2(0.9)^0 = 2$

2^{nd} term $= 2(0.9)^1 = 1.8$

$r = \frac{1.8}{2} = 0.9$

$S_\infty = \frac{2}{1-0.9}$

$$\boxed{S_\infty = 20}$$

b) $\sum_{i=1}^{\infty} 3\left(\frac{7}{6}\right)^{i}$

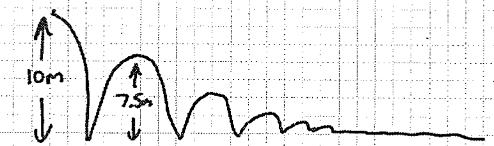
$a = 3\left(\frac{7}{6}\right) = \frac{21}{6} = 3.5$

2nd term: $3\left(\frac{7}{6}\right)^2 = 4.08\overline{3} \longrightarrow \frac{2^{nd}}{1^{st}} = \frac{\cancel{3}\left(\frac{7}{6}\right)^{\cancel{2}}}{\cancel{3}\left(\cancel{\frac{7}{6}}\right)} = \frac{7}{6} \sim 1.1\overline{6}$

$\boxed{\text{NO FINITE SUM / DIVERGENT}}$

(3) A ball is dropped from a height of 10m. On each bounce the ball rises to 75% of the height from which it fell.

a) Find the total distance the ball travels before coming to rest.



$10 + 7.5 + 7.5 + 5.6 + 5.6 + \dots$

Infinite Sum

$\boxed{S = 2\left(\frac{a}{1-r}\right) - a}$

*NOT ON FORMULA SHEET

$$S = 2\left(\frac{10}{1-0.75}\right) - 10$$

$\boxed{S = 70m}$

b) Find the vertical distance that the ball travels up to and including its 8th bounce

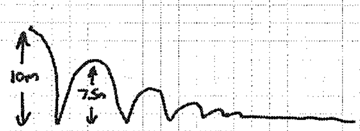
$n = 8$
$a = 10$
$r = 0.75$

$\boxed{S = 2\left(\frac{a(1-r^n)}{1-r}\right) - a}$

$$S_8 = 2\left(\frac{10(1-0.75^8)}{1-0.75}\right) - 10$$

$\boxed{S_8 = 61.99m}$

c) How high did the ball bounce immediately after its 4th bounce?



$10 + 7.5 + 7.5 + 5.6 + 5.6 + \ldots$

$t_n = ar^{n-1}$

$t_4 = 7.5(0.75)^3$ OR $t_5 = 10(0.75)^4$

Pg 35

\# 1-3 (a,c,e)

5 (a,b)

* Review Questions

Pg 40

\# 1-53

(4) Find the rational number represented by the repeating decimal:

a) $0.1\overline{7}$

$$0.1777\ldots = \frac{1}{10} + \underbrace{\frac{7}{100} + \frac{7}{1000} + \frac{7}{10000} + \ldots}_{r = \frac{1}{10}}$$

$$S = \frac{a}{1-r} = \frac{1}{10} + \frac{\frac{7}{100}}{1-\frac{1}{10}} = \frac{1}{10} + \frac{\frac{7}{100}}{\frac{10}{10}-\frac{1}{10}} = \frac{1}{10} + \frac{\frac{7}{100}}{\frac{9}{10}} = \frac{1}{10} + \left(\frac{7}{100}\right)\left(\frac{10}{9}\right)$$

$$= \frac{1}{10} + \frac{7}{90} = \frac{9}{90} + \frac{7}{90} = \boxed{\frac{16}{90}}$$

b) $2.5\overline{24}$

$$2.52424\ldots = 2 + \frac{5}{10} + \underbrace{\frac{24}{1000} + \frac{24}{100000}}_{r = \frac{1}{100}} + \ldots$$

$$= 2 + \frac{5}{10} + \frac{\frac{24}{1000}}{1-\frac{1}{100}} = 2 + \frac{5}{10} + \frac{\frac{24}{1000}}{\frac{99}{100}} = 2 + \frac{5}{10} + \left(\frac{24}{1000}\right)\left(\frac{100}{99}\right)$$

$$= 2 + \frac{5}{10} + \frac{24}{990} = 2 + \frac{495}{990} + \frac{24}{990} = \boxed{2\frac{519}{990}}$$

Note Title 2012-05-23

SIGMA NOTATION

$\sum$ "sigma" is used to represent a sum of terms

Ex $\sum_{k=1}^{4} 5k = 5(1)+5(2)+5(3)+5(4)$

Upper Limit

Lower Limit

$= 5 + 10 + 15 + 20$

$= 50$

b) $\sum_{k=-2}^{3} k^2+k$

$= (-2)^2+(-2)+(-1)^2+(-1)+0^2+0+1^2+1+2^2+2+3^2+3$

$= 2+0+0+2+6+12$

$= \boxed{22}$

(1) Write in expanded form & determine the sum

a) $\sum_{k=3}^{9} 2k$

$= 6+8+10+12+14+16+18$

$= \boxed{84}$

* If the summation expression is a linear function, then the summation is an arithmetic series

Ex $\sum_{k=1}^{10} 3k+2 \longrightarrow$ Arithmetic Series since $y=3k+2$ is linear

* Can use arithmetic series formula

$\sum_{k=1}^{10} 3k^2+2 \longrightarrow$ Not an Arithmetic Series since $y=3k^2+2$ is non-linear

$$\boxed{\text{Upper Limit} - \text{Lower Limit} + 1 = \#\text{ of terms}}$$

<u>Ex</u> $\sum_{k=3}^{11} 4k+1$ # of terms: $11-3+1 = 9$ terms when expanded

② Evaluate (Determine the sum)

a) $\sum_{k=1}^{50} 4k-1$

Linear ∴ use sum formula $S_n = \frac{n}{2}(a+\ell)$

$n = 50$ ↑ $50-1+1$

$a = 4(1)-1$

$a = 3$

$\ell = 4(50)-1$

$\ell = 199$

$S_{50} = \frac{50}{2}(3+199)$

$$\boxed{S_{50} = 5050}$$

b) $\sum_{k=4}^{35} 4-2k$

$a = -4$

$\ell = -66$

$n = 32$

$S_n = \frac{n}{2}(a+\ell)$

$S_{32} = \frac{32}{2}(-4+(-66))$

$$\boxed{S_{32} = -1120}$$

③ Write the sum using sigma notation

a) $\frac{1}{2} + \frac{4}{3} + \frac{9}{4} + \frac{16}{5} + \ldots + \frac{100}{11}$

$$\sum_{k=1}^{10} \frac{k^2}{k+1}$$

b) $\frac{1}{3}+\frac{2}{4}+\frac{3}{5}+\frac{4}{6}+\ldots+\frac{8}{10}$

$$\boxed{\sum_{k=1}^{8} \frac{k}{k+2}}$$

c) $5+9+13+\ldots+137$

Arithmetic Series $\rightarrow \therefore \sum_{k=1} mx+b$

$t_n = a+(n-1)d$

$$\sum_{k=1}^{34} \boxed{mk+b}$$

$137 = 5+(n-1)(4)$

$\frac{132}{4} = n-1$

$33+1 = \underline{\underline{n=34}}$

$\underline{\underline{d=4}}$

$$\boxed{\sum_{k=1}^{34} (4k+1)}$$

d) $23+19+15+\ldots+(-305)$

$$\sum_{k=1}^{\square} -4k+\square$$

$t_n = a+(n-1)d$

$-305 = 23+(n-1)(-4)$

$\frac{-328}{-4} = n-1$

$82 = n-1$

$\underline{\underline{n=83}}$

$d=-4$

$$\boxed{\sum_{k=1}^{83} (-4k+27)}$$

Pg 10 # 5,6

Pg 18 # 3,5

Note Title 2012-05-31

Chp 1 Review

1. Determine the first term and common difference of the following arithmetic sequence: $t_{50} = 140$ and $t_{70} = 180$

$t_n = a + (n-1)d$

$140 = a + 49d$ ①
$180 = a + 69d$ ②

① − ② $-40 = -20d$

$\boxed{d = 2}$

$140 = a + 49(2)$
$140 - 98 = a$

$\boxed{a = 42}$

2. Determine r and a for the following geometric sequence: $t_3 = 99$ and $t_5 = 11$.

$t_n = ar^{n-1}$

$99 = ar^2$ ①
$11 = ar^4$ ② $\rightarrow$ $11 = a\left(\pm\frac{1}{3}\right)^4$

① ÷ ② $9 = r^{-2}$

$\frac{1}{9} = r^2$

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

$11 = a\left(\frac{1}{81}\right)$

$(11)(81) = a$

$\boxed{891 = a}$

3. Determine the sum of the arithmetic series: $20 + 14 + 8 + \ldots - 70$

$S_n = \frac{n}{2}(a + l)$

$t_n = a + (n-1)d$

$-70 = 20 + (n-1)(-6)$

$\frac{-90}{-6} = n - 1$

$15 = n - 1$

$n = 16$

$S_{16} = \frac{16}{2}(20 + (-70))$

$S_{16} = 8(-50)$

$\boxed{S_{16} = -400}$

4. Determine the sum: $17 - 51 + 153 - \ldots - 334611$

$a = 17$
$r = -3$
$l = -334611$

$S_n = \frac{a - rl}{1 - r}$

$S_n = \frac{17 - (-3)(-334611)}{1 - (-3)}$

$= \frac{17 - 1003833}{4} = \boxed{-250954}$

$\boxed{* \text{Pg } 376 \ \# 1\text{-}53}$

(5) Determine the number of terms algebraically (Day 2)

$1, 3x^2, 9x^4, \ldots, 243x^{10}$

$a = 1$

$r = 3x^2$

$t_n = l = 243x^{10}$

$x^{10} = x^{2(n-1)}$

$10 = 2n - 2$

$12 = 2n$

$\boxed{n = 6}$

OR

$t_n = ar^{n-1}$

$243x^{10} = 1(3x^2)^{n-1}$

$243x^{10} = (3x^2)^{n-1}$

$(3x^2)^{\boxed{5}} = (3x^2)^{n-1}$

$5 = n - 1$

$\boxed{n = 6}$

(5) Determine whether convergent or divergent and state the sum where possible

a) $\frac{5}{12} - \frac{5}{6} + \frac{5}{3} - \frac{10}{3} + \ldots$

$r = \dfrac{-\frac{5}{6}}{\frac{5}{12}}$

$r = -2$

$\boxed{\text{NO FINITE SUM / DIVERGENT}}$

b) $-64 + 16 - 4 + \ldots$

$r = \frac{16}{-64}$

$r = -\frac{1}{4}$

CONVERGENT

$S_\infty = \frac{a}{1-r}$

$S_\infty = \frac{-64}{1-(-\frac{1}{4})}$

$\boxed{\text{*Pg 40 *1-53}}$

$S_\infty = \frac{-64}{1.25} = \boxed{-51.2}$

(7) The sum of an infinite series is 120 and the common ratio is $-\frac{2}{5}$. Determine the first three terms of the series.

$S_\infty = \frac{a}{1-r}$

$120 = \frac{a}{1-(-\frac{2}{5})}$

$120 = \frac{a}{1+\frac{2}{5}}$

$120 = \frac{a}{1.4}$

$a = (120)(1.4) = 168$

$\times -\frac{2}{5}$ $\times -\frac{2}{5}$

$\boxed{168, -67.2, 26.88}$

8 Bouncing Ball: 6.5m, 47%

a) Comes to rest

$S = 2\left(\frac{a}{1-r}\right) - a$

$S = 2\left(\frac{6.5}{1-0.47}\right) - 6.5$

$\boxed{S = 18.03m}$

b) 7^{th} bounce

$S = 2\left(\frac{a(1-r^n)}{1-r}\right) - a$

$S = 2\left(\frac{6.5(1-0.47^7)}{1-0.47}\right) - 6.5$

$\boxed{S = 17.90m}$

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#1-53

*When making sigma:

Arithmetic: d

$\sum_{k=1}^{n} mk+b$

Geometric:

$\sum_{k=1}^{n} ar^{k-1}$