Problem 1

	A
=	
1	a_1
2	d
3	n_1
4	n_2
5	
6	
7	
8	
9	
10	
11	

A1 a_1

S Method $a_n = 275 + (n-1)(^-9.5)$

$a_{1000} = 275 + (1000-1)(^-9.5)$

$= ^-9215.5$

$S_{1000} = (1000/2)[275 + ^-9215.5]$

$= ^-4470250.$

$= ^-4.47025\text{E}6$ (scientific notation)

infinite sum **inf_sum** ▸ $-\infty$

$$\sum_{n=1}^{1000} 275 + (n-1)(^-9.5) = ^-4.47025\text{E}6$$

Problem 2

	A
=	
1	a_1
2	d
3	n_1
4	n_2
5	
6	
7	
8	
9	
10	
11	

A1 a_1

S Method $a_n = 926 + (n-1)(11.4)$

$a_{75} = 926 + (75-1)(11.4)$

$= 1769.6$

$S_{75} = (75/2)[926 + 1769.6]$

$= 101085.$

infinite sum ∞

$$\sum_{n=1}^{75} 926 + (n-1)(11.4) = 101085.$$

Problem 3

	A	B
=		
1	a_1	
2	r	
3	n_1	
4	n_2	
5		
6		
7		
8		
9		
10		
11		

A1 a_1

$$S_{37} = \frac{1-\left(\frac{8}{9}\right)^{37}}{1-\frac{8}{9}} = \frac{4003188949503703117845921654166874420}{22528399544939174411840147874772641} \approx 177.6952$$

$$S_8 = \frac{1-\left(\frac{8}{9}\right)^{8}}{1-\frac{8}{9}} = \frac{525390100}{4782969} \approx 109.846$$

$$S_{37}-S_8 = \frac{1528533962244628819401976799842795520}{22528399544939174411840147874772641} \approx 67.8492$$

$$n\_1 \sum_{n=9}^{37} 20\left(\frac{8}{9}\right)^{n-1} = \frac{1528533962244628819401976799842795520}{22528399544939174411840147874772641} \approx 67.8492$$

Problem 4

	A	B
=		
1	a_1	
2	d	
3	n_1	
4	n_2	
5		
6		
7		
8		
9		
10		
11		

A1 a_1

S Method $a_n = 542 + (n-1)(-7.2)$

$a_{55} = 542 + (55-1)(-7.2) = 153.2$

$S_{55} = (55/2)[542 + 153.2] = 19118.$

$a_{26} = 542 + (26-1)(-7.2) = 362.$

$S_{26} = (26/2)[542 + 362.] = 11752.$

$S_{55} - S_{26} = 19118. - 11752. = 7366.$

Infinite Sum = $-\infty$

$$\sum_{n=27}^{55} 542 + (n-1)(-7.2) = 7366.$$

Problem 5

	A	B
1	a_1	
2	d	
3	n_1	
4	n_2	
5		
6		
7		
8		
9		
10		
11		

A1 a_1

S Method $a_n = 6000 + (n-1)(^-5)$

$a_{17} = 6000 + (17-1)(^-5)$

$= 5920$

$S_{17} = (17/2)[6000 + 5920]$

$= 101320$

infinite sum $-\infty$

$$\sum_{n=1}^{17} 6000 + (n-1)(^-5) = 101320$$

Problem 6

	A	B
1	a_1	
2	r	
3	n_1	
4	n_2	
5		
6		
7		
8		
9		
10		
11		

A1 a_1

$$a_n = 50 \left(\frac{5}{6}\right)^{n-1}$$

$$S_9 = \frac{1-\left(\frac{5}{6}\right)^9}{1-\frac{5}{6}} = \frac{203114275}{839808} \approx 241.858$$

$$\sum_{n=1}^{9} 50 \left(\frac{5}{6}\right)^{n-1} = \frac{203114275}{839808} \approx 241.858$$

infinite sum 300

Problem 7

	A	B
=		
1	a_1	
2	r	
3	n_1	
4	n_2	
5		
6		
7		
8		
9		
10		
11		

A1 a_1

$$a_n = 40\left(\frac{-5}{4}\right)^{n-1}$$

$$S_{25} = \frac{1-\left(\frac{-5}{4}\right)^{25}}{1-\frac{-5}{4}} = \frac{166193957657664305}{35184372088832} \approx 4723.5164$$

$$\sum_{n=1}^{25} 40\left(\frac{-5}{4}\right)^{n-1} = \frac{166193957657664305}{35184372088832}$$

$$\approx 4723.5164$$

infinite sum *impossible to determine*

Problem 8

	A	B	C	D	E	F	G	H
=								
1	a_1	71	differenc...	15	ratio	86/71		

A1 a_1

$\{71,86,116\}$

This is a recursive pattern The difference in 86 and 71 is 15

The difference in 116 and 86 is 30

So a pattern for the change can be written as: Add 15

Add 15 more than the last time to each term

a_1 = 71

$a_n=a_{n-1}+(15+(n-2)(15))$

$a_4=116+(15+(4-2)(15))=116+45=161$

$a_5=161+(15+(5-2)(15))=161+60=221$

$a_6=221+(15+(6-2)(15))=221+60=296$

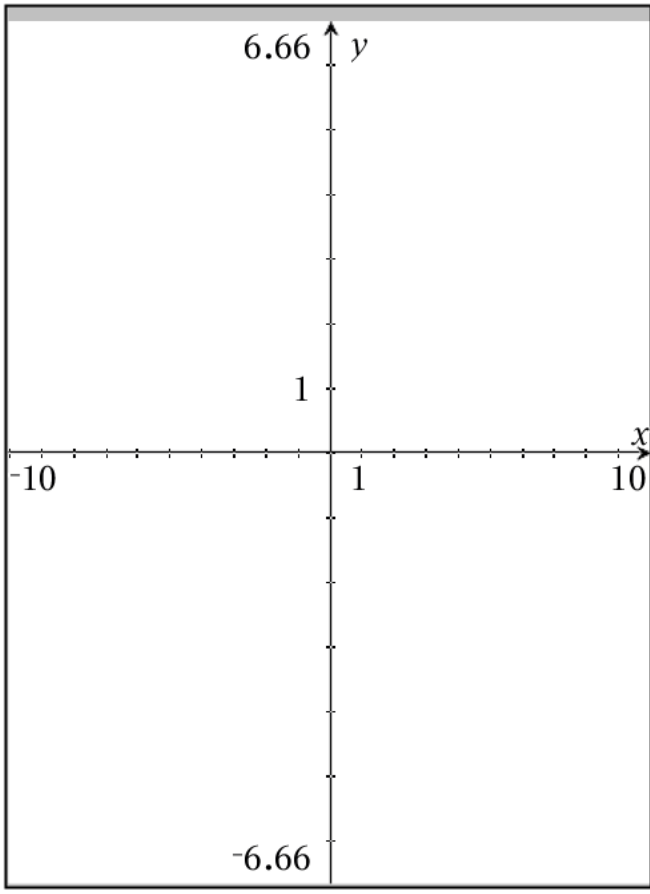
$a_7=296+(15+(7-2)(15))=296+90=386$

$a_8=386+(15+(8-2)(15))=386+105=491$

a_1 ▸ 71

$a_n=a_{n-1}+(15\cdot n+{}^{-}15)$

This is a "fancier" version a_1 = 71 $a_n=71+\sum_{1}^{n-1}(15+(n-1)(15))$



u1$(\{1,2,3\})$ ▸ $\{71,86,101\}$

Problem 9

TYPO

Problem 10

	A	B	C	D	E	F	G	H
=								
1	a_1	4050000	differenc...	⁻3105000	ratio	7/30		

A1 a_1

$\{4050000,945000,220500\}$

This is a geometric pattern The ratio is 945000 divided by 4050000 is $\frac{7}{30}$

The ratio is 220500 divided by 945000 is $\frac{7}{30}$

$a\_1 = 4050000$ $r = \frac{7}{30}$ $a_n = 4050000\left(\frac{7}{30}\right)^{n-1}$

$a_4 = 4050000\left(\frac{7}{30}\right)^{4-1} = 51450$ $a_5 = 4050000\left(\frac{7}{30}\right)^{5-1} = 12005$ $a_4 = 4050000\left(\frac{7}{30}\right)^{6-1} = \frac{16807}{6} =$

2801.16666667

$a_9 = 4050000\left(\frac{7}{30}\right)^{9-1} = \frac{5764801}{162000} = 35.585191358$

Problem 11

	A	B	C	D	E	F	G	H
=								
1	a_1	92	ratio	31	diff	6		

A1 a_1

$\{92,2852,105524,4537532\}$

This is a recursive pattern The ratio between 2852 and 92 is 31 The ratio between 105524 and 2852 is 37
The ratio between 4537532 and 105524 is 43

So a pattern for the change can be written as: multiply by 31

Add 6 more to the multiplier than the last time to each term

$a\_1 = 92$ $a_5 = 4537532(31+(5-2)(6)) = 4537532[49] = 222339068$

$a_n = a_{n-1}(31+(n-2)(6))$ $a_6 = 222339068(31+(6-2)(6)) = 222339068+55 = 12228648740$

$a_7 = 12228648740+(31+(7-2)(6)) = 12228648740+61 = 745947573140$

$a\_1 \blacktriangleright 92$ $a_8 = 745947573140+(31+(8-2)(6)) = 745947573140+67 = 49978487400380$

$a_n = a_{n-1}(6\cdot n+19)$ $a_9 = 49978487400380+(31+(9-2)(6)) = 49978487400380+73 = 3648429580227740$

This is a "fancier" version $a\_1 = 92$ $a_n = 92 + \prod^{n-1} \left(31+(n-1)(6)\right)$

Problem 12

	A	B	C	D	E	F	G	H
=								
1	a_1	1536	differenc...	8448	ratio	13/2		

A1 a_1

$\{1536, 9984, 64896\}$

This is a geometric pattern   The ratio is 9984 divided by 1536 is $\frac{13}{2}$

The ratio is 64896 divided by 9984 is $\frac{a\_3}{a\_2} \blacktriangleright \frac{13}{2}$

$a\_1 = 1536 \quad r = \frac{13}{2} \quad a_n = 1536\left(\frac{13}{2}\right)^{n-1}$

$a_4 = 1536\left(\frac{13}{2}\right)^{4-1} = 421824 \qquad a_5 = 1536\left(\frac{13}{2}\right)^{5-1} = 2741856 \qquad a_4 = 1536\left(\frac{13}{2}\right)^{6-1} = 17822064$

$a_{12} = 1536\left(\frac{13}{2}\right)^{12-1} = \frac{5376481182111}{4} = 1.34412029553\text{E}12$

	A	B	C	D	E	F	G	H
=								
1	1536							
2	9984							
3	64896							
4								
5								
6								
7								
8								
9								
10								
11								

A1 1536

Problem 13

Writing a sequence from two of its terms

(non sequential)

Step 1) What type of sequence is given?

When given arthimetic sequence terms

Step 2) Write the definition of each term using a_1 and d

Step 3) Solve the resulting linear system

Step 4) Write the arithmetic sequence using a_1 and d

Step 5) Complete the missing terms in the sequence to check to see that rule actually works for each term

	A	B
=		
1	given_term1	
2	term_in_seq1	
3	given_term2	
4	term_in_seq2	

A1 *given_term1*

So we know $a_{13}=480$ and $a_{17}=^{-}36$ and we also know that this is an arithmetic sequence

so all terms must follow $a_n=a_1+(n-1)d$, including a_{13} and a_{17}

so $a_{13}=a_1+(13-1)\text{d}$ or $480=a_1+12\text{d}$

so $a_{17}=a_1+(17-1)\text{d}$ or $^{-}36=a_1+16\text{d}$

This system can be solved a variety of ways, but basically you can subtract the higher sequence term and lower sequence term and it yields d and a_1

	A	B	C
=			
1	a_5	480	
2	a_15	-36	
3			
4			
5			
6			
7			
8			
9			
10			
11			

A1 *a_5*

$a_{17}-a_{13}$ implies $^{-}36-480={}^{-}516$

$a_{17}-a_{13}$ implies $(a_1+16\,d)-(a_1+12\,d)=a_1+16\,d-a_1-12\,d=4\,d$

This allows us to find "d" $\quad {}^{-}516=4\,d$

$$^{-}516/4=4\,d/4$$

$$^{-}129=\mathbf{d}$$

We can now use either $480=a_1+12\,d$ or $^{-}36=a_1+16\,d$ to find a_1

$480=a_1+12(^{-}129)$ leads to $480=a_1+{}^{-}1548$ or $a_1=480-{}^{-}1548=2028$

$^{-}36=a_1+16(^{-}129)$ leads to $^{-}36=a_1+{}^{-}2064$ or $a_1={}^{-}36-{}^{-}2064=2028$

so our arithmetic sequence is $a_n=2028+(n-1)(^{-}129)$

and our finite sequence is

$\{2028,1899,1770,1641,1512,1383,1254,1125,996,867,738,609,480,351,222\}$

Problem 14

Writing a sequence from two of its terms (non sequential)

Step 1) What type of sequence is given?

When given geometric sequence terms

Step 2) Write the definition of each term using a_1 and r

Step 3) Solve the resulting proportion

(I suggest putting higher sequence term (not value) on top)

(this will require radical operations)

Step 4) Write the geometric sequence using a_1 and r

Step 5) Complete the missing terms in the sequence to check to see that rule actually works for each term

	A	B	C
=			
1	given_term1	7776/16...	
2	erm_in_seq1	4	
3	given_term2	1679616...	
4	erm_in_seq2	7	
5			
6			
7			
8			
9			
10			
11			

A1 *given_term1*

So we know $a_2=\frac{7776}{16807}$ and $a_7=\frac{1679616}{5764801}$ and we also know that this is an geometic sequence

so all terms must follow $a_n=a_1(r)^{n-1}$, including a_1 and a_7

so $a_2=a_1$r^(4−1) or $\frac{7776}{16807}=a_1\cdot r^3$

so $a_7=a_1$r^(7−1) or $\frac{1679616}{5764801}=a_1\cdot r^6$

This system can be solved a variety of ways, but basically you can divide the higher sequence term and lower sequence term then apply necessary radical and it yields r and a_1

	A	B	C
=			
1	ate_term	7776/16...	
2	early_te...	1679616...	
3			
4			
5			
6			
7			
8			
9			
10			
11			

A1 *late_term*

a_7/a_4 implies $\frac{1679616}{5764801}/\frac{7776}{16807}=\frac{216}{343}$

a_7/a_4 implies $a_1\cdot r^6/a_1\cdot r^3=r^3$

This allows us to find "r" $r^3=\frac{216}{343}$ which leads to $\sqrt[3]{r^3}=\sqrt[3]{\frac{343}{216}}$

$r=\frac{7}{6}$

I would use the smaller sequence term to use $\frac{7776}{16807}=a_1\cdot r^3$ to find a_1

$\frac{7776}{16807}=a_1(\frac{6}{7})$^3 which leads to $\frac{7776}{16807}=\frac{216}{343}a_1$

which leads to $\frac{7776}{16807}\cdot(\frac{343}{216})=(\frac{343}{216})(\frac{216}{343})a_1$ or $a_1=\frac{36}{49}\approx 0.734693877551$

so our geometric sequence is $a_n=\frac{36}{49}(\frac{6}{7})$^(n−1)

and our finite sequence is $\left\{\frac{36}{49},\frac{216}{343},\frac{1296}{2401},\frac{7776}{16807},\frac{46656}{117649},\frac{279936}{823543},\frac{1679616}{5764801}\right\}$

Problem 15

A seq_1	
=	
1	42
2	63
3	84
4	105
5	126
6	147
7	168

A1 42

$42+63+84+105+126+147+168+189+210+231+252+273+294+315+336+357+378$

this is the sum of the following arthimetic sequence

$\{42,63,84,105,126,147,168,189,210,231,252,273,294,315,336,357,378,399,42$

Method 1: count terms (this is n) n =20

add first and last terms

First term (a_1) = 42 Last term (a_{17})=378

Sum of first and last term 42 + 378 =483

multiply sum of first and last terms by 1/2 the number of terms

$(20/2)(42+441)=10(483)=4830$

$$\sum_{n=1}^{20} 42+(n-1)(21) = 4830$$ *This is how Riemann would have applied*

Problem 16

A seq_1	
=	
1	8/27
2	16/81
3	32/243
4	64/729
5	128/2187
6	256/6561

A1 $\frac{8}{27}$

$\frac{8}{27}+\frac{16}{81}+\frac{78134919483}{593337044824}+\frac{64}{729}+\frac{128}{2187}+\frac{1953405025}{50063634254}+\frac{976563403}{37542377854}$

this is the sum of the following geometric sequence

$\left\{\frac{8}{27},\frac{16}{81},\frac{32}{243},\frac{64}{729},\frac{128}{2187},\frac{256}{6561},\frac{512}{19683},\frac{1024}{59049},\frac{2048}{177147},\frac{4096}{531441}\right\}$

Method 1: Count terms (this is n) n =10

Determine a_1 and r First term (a_1) = $\frac{8}{27}$ $r=\frac{2}{3}$

Use $S_n = a\_1 \cdot \frac{1-(r)^n}{1-r}$

$S_{10} = \frac{8}{27} \cdot (1-(\frac{2}{3})\text{^}10/(1-\frac{2}{3}) = a\_1 \cdot \frac{1-r\_1^{n\_1}}{1-r\_1} = \frac{464200}{531441}$

$$\sum_{n=1}^{10} \frac{8}{27}\left(\frac{2}{3}\right)^{(n-1)} = \frac{464200}{531441}$$

This is how Riemann would have applied

0.87347419563

$1.0 \cdot p$

Problem 17

	A missed	B raw	C percent	D	E	F	G	H
=		=140−mis	=raw/(1.4)					
1	0	140	100.					
2	0.5	139.5	99.6428...					
3	1.	139.	99.2857...					
4	1.5	138.5	98.9285...					
5	2.	138.	98.5714...					
6	2.5	137.5	98.2142...					
7	3.	137.	97.8571...					
8	3.5	136.5	97.5					
9	4.	136.	97.1428...					
10	4.5	135.5	96.7857...					
11	5.	135.	96.4285...					

A1 0

Problem 18

7^{10} ▸ 282475249

$\sqrt{2304}$ ▸ 48

4^2 ▸ 16

$(4\cdot 3)^2$ ▸ 144

$(4\cdot 3\cdot 4)^2$ ▸ 2304

$(4\cdot 3\cdot 4\cdot 5)^2$ ▸ 57600

$(4\cdot 3\cdot 4\cdot 5\cdot 6)^2$ ▸ 2073600

$(4\cdot 3\cdot 4\cdot 5\cdot 6\cdot 7)^2$ ▸ 101606400

$(4\cdot 3\cdot 4\cdot 5\cdot 6\cdot 7\cdot 8)^2$ ▸ 6502809600

$(4\cdot 3\cdot 4\cdot 5\cdot 6\cdot 7\cdot 8\cdot 9)^2$ ▸ 526727577600

$(4\cdot 3\cdot 4\cdot 5\cdot 6\cdot 7\cdot 8\cdot 9\cdot 10)^2$ ▸ 52672757760000

$101+90\cdot 10^{2-1}$	1001
$1001+90\cdot 10^{3-1}$	10001
$10001+90\cdot 10^{4-1}$	100001
$100001+90\cdot 10^{5-1}$	1000001