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 $a_n=375+(n-1)(^-8.5)$

$a_{1000}=375+(1000-1)(^-8.5)$

$=^-8116.5$

$S_{1000}=(1000/2)[375+^-8116.5]$

$= ^-3870750.$

$=^-3.87075E6$ (scientific notation)

infinite sum inf_sum ▸ $-\infty$

$$\sum_{n=1}^{1000} 375+(n-1)(^-8.5)=^-3.87075E6$$

Problem 2

	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 $a_n=826+(n-1)(3.4)$

$a_{85}=826+(85-1)(3.4)$

$=1111.6$

$S_{85}=(85/2)[826+1111.6]$

$= 82348.$

infinite sum ∞

$$\sum_{n=1}^{85} 826+(n-1)(3.4)= 82348.$$

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

$$S_{26} = \frac{1-\left(\frac{8}{11}\right)^{26}}{1-\frac{8}{11}} = \frac{7943436148785448567776374780}{108347059433883722041830251} \approx 73.3147$$

$$S_{9} = \frac{1-\left(\frac{8}{11}\right)^{9}}{1-\frac{8}{11}} = \frac{14824866420}{214358881} \approx 69.1591$$

$$S_{26} - S_{9} = \frac{450251468897485348363304960}{108347059433883722041830251} \approx 4.1556$$

$$n\_1 \sum_{n=10}^{26} 20\left(\frac{8}{11}\right)^{n-1} = \frac{450251468897485348363304960}{108347059433883722041830251} \approx 4.1556$$

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 $a_n = 942 + (n-1)(-6.2)$

$a_{58} = 942 + (58-1)(-6.2) = 588.6$

$S_{58} = (58/2)[942 + 588.6] = 44387.4$

$a_{28} = 942 + (28-1)(-6.2) = 774.6$

$S_{28} = (28/2)[942 + 774.6] = 24032.4$

$S_{58} - S_{28} = 44387.4 - 24032.4 = 20355.$

Infinite Sum = $-\infty$

$$\sum_{n=29}^{58} 942 + (n-1)(-6.2) = 20355.$$

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 $a_n = 8000 + (n-1)(6)$

$a_{17} = 8000 + (17-1)(6)$

$= 8096$

$S_{17} = (17/2)[8000 + 8096]$

$= 136816$

infinite sum ∞

$$\sum_{n=1}^{17} 8000 + (n-1)(6) = 136816$$

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

$$a_n = 800 \left(\frac{7}{8}\right)^{n-1}$$

$$S_9 = \frac{1-\left(\frac{7}{8}\right)^9}{1-\frac{7}{8}} = \frac{2346603025}{524288} \approx 4475.7901$$

$$\sum_{n=1}^{9} 800 \left(\frac{7}{8}\right)^{n-1} = \frac{2346603025}{524288} \approx 4475.7901$$

infinite sum 6400

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

$$a_n = 480\left(\frac{-5}{6}\right)^{n-1}$$

$$S_{25} = \frac{1-\left(\frac{-5}{6}\right)^{25}}{1-\frac{-5}{6}} = \frac{13058323297184842955}{4935813894085017 6} \approx 264.5627$$

$$\sum_{n=1}^{25} 480\left(\frac{-5}{6}\right)^{n-1} = \frac{13058323297184842955}{49358138940850176}$$

$$\approx 264.5627$$

$$\textit{infinite sum} \quad \frac{2880}{11} \approx 261.818181818$$

Problem 8

	A	B	C	D	E	F	G	H
=								
1	a_1	87	differenc...	15	ratio	34/29		

A1 a_1

{87,102,132}

This is a recursive pattern   The difference in 102 and 87 is 15

The difference in 132 and 102 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 = 87

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

$a_4 = 132 + (15 + (4-2)(15)) = 132 + 45 = 177$

$a_5 = 177 + (15 + (5-2)(15)) = 177 + 60 = 237$

$a_6 = 237 + (15 + (6-2)(15)) = 237 + 60 = 312$

$a_7 = 312 + (15 + (7-2)(15)) = 312 + 90 = 402$

$a_8 = 402 + (15 + (8-2)(15)) = 402 + 105 = 507$

a_1 ▸ 87

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

This is a "fancier" version a_1 = 87 $a_n = 87 + \sum_{1}^{n-1} (15 + (n-1)(15))$

$87 \cdot 15$	1305

Problem 9

TYPO

Problem 10

	A	B	C	D	E	F	G	H
=								
1	a_1	4050000	differenc...	10800000	ratio	11/3		

A1 a_1

The ratio is 5450000 divided by 14850000 is $\frac{109}{297}$

a_1 = 4050000 $r = \frac{11}{3}$ $a_n = 4050000\left(\frac{11}{3}\right)^{n-1}$

$a_4 = 4050000\left(\frac{11}{3}\right)^{4-1} = 199650000$ $a_5 = 4050000\left(\frac{11}{3}\right)^{5-1} = 732050000$ $a_4 = 4050000\left(\frac{11}{3}\right)^{6-1} = \frac{8052550000}{3} = 2684183333.33$

$a_9 = 4050000\left(\frac{11}{3}\right)^{9-1} = \frac{10717944050000}{81} = 132320296914.$

$4050000+10800000\left(\frac{11}{3}\right)^{2-2}$	14850000
$4050000+10800000\left(\frac{11}{3}\right)^{3-2}$	43650000
$4050000+10800000\left(\frac{11}{3}\right)^{4-2}$	149250000
$\frac{4050000\cdot 3}{11}$	$\frac{12150000}{11}$

Problem 11

	A	B	C	D	E	F	G	H
=								
1	a_1	96	ratio	31	diff	6		

A1 a_1

{96,2976,110112,4734816}

This is a recursive pattern The ratio between 2976 and 96 is 31 The ratio between 110112 and 2976 is 37 The ratio between 4734816 and 110112 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 = 96

$a_n = a_{n-1}(31+(n-2)(6))$

a_1 ▸ 96

$a_n = a_{n-1}(6\cdot n+19)$

$a_5 = 4734816(31+(5-2)(6)) = 4734816[49] = 232005984$

$a_6 = 232005984(31+(6-2)(6)) = 232005984+55 = 12760329120$

$a_7 = 12760329120+(31+(7-2)(6)) = 12760329120+61 = 778380076320$

$a_8 = 778380076320+(31+(8-2)(6)) = 778380076320+67 = 52151465113440$

$a_9 = 52151465113440+(31+(9-2)(6)) = 52151465113440+73 = 3807056953281120$

This is a "fancier" version a_1 = 96 $a_n = 96+\prod^{n-1}(31+(n-1)(6))$

Problem 12

	A	B	C	D	E	F	G	H
=								
1	a_1	3072	differenc...	16896	ratio	13/2		

A1 a_1

{3072,19968,129792}

This is a geometric pattern The ratio is 19968 divided by 3072 is $\frac{13}{2}$

The ratio is 129792 divided by 19968 is $\frac{13}{2}$

a_1 = 3072 $r = \frac{13}{2}$ $a_n = 3072\left(\frac{13}{2}\right)^{n-1}$

$a_4 = 3072\left(\frac{13}{2}\right)^{4-1} = 843648$ $a_5 = 3072\left(\frac{13}{2}\right)^{5-1} = 5483712$ $a_4 = 3072\left(\frac{13}{2}\right)^{6-1} = 35644128$

$a_{12} = 3072\left(\frac{13}{2}\right)^{12-1} = \frac{5376481182111}{2} = 2.68824059106\text{E}12$

$\frac{6144}{13.}$	472.615384615
$36\cdot 6\cdot 6$	1296
$\frac{96}{6}$	16
16	16
$96\cdot 216$	20736

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 $a_{13}=960$ and $a_{17}=^{-}144$ 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 $960=a_1+12\text{d}$

so $a_{17}=a_1+(17-1)\text{d}$ or $^{-}144=a_1+16\text{d}$

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
1	a_5	960
2	a_15	-144
3		
4		
5		
6		
7		
8		
9		
10		
11		

A1 a_5

$a_{17}-a_{13}$ implies $^{-}144-960=^{-}1104$

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

This allows us to find "d" $\quad ^{-}1104=4\text{d}$

$^{-}1104/4=4\text{d}/4$

$^{-}276=\textbf{d}$

We can now use either $960=a_1+12\text{d}$ or $^{-}144=a_1+16\text{d}$ to find a_1

$960=a_1+12(^{-}276)$ leads to $960=a_1+^{-}3312$ or $a_1=960-^{-}3312=4272$

$^{-}144=a_1+16(^{-}276)$ leads to $^{-}144=a_1+^{-}4416$ or $a_1=^{-}144-^{-}4416=4272$

so our arithmetic sequence is $a_n=4272+(n-1)(^{-}276)$

and our finite sequence is

{4272,3996,3720,3444,3168,2892,2616,2340,2064,1788,1512,1236,960,684,408

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	1296/24...	
2	term_in_seq1	3	
3	given_term2	279936/...	
4	term_in_seq2	6	
5			
6			
7			
8			
9			
10			
11			

A1 *given_term1*

So we know $a_2 = \frac{1296}{2401}$ and $a_7 = \frac{279936}{823543}$ 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 $a_2 = a_1 r\text{^}(3-1)$ or $\frac{1296}{2401} = a_1 \cdot r^2$

so $a_7 = a_1 r\text{^}(6-1)$ or $\frac{279936}{823543} = a_1 \cdot r^5$

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	earlier	1296/24...	
2	later	279936/...	
3			
4			
5			
6			
7			
8			
9			
10			
11			

A1 *earlier*

a_6/a_3 implies $\frac{279936}{823543} / \frac{1296}{2401} = \frac{216}{343}$

a_6/a_3 implies $a_1 \cdot r^5 / a_1 \cdot r^2 = r^3$

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

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

I would use the smaller sequence term to use $\frac{1296}{2401} = a_1 \cdot r^2$ to find a_1

$\frac{1296}{2401} = a_1 (\frac{6}{7})$^2 which leads to $\frac{1296}{2401} = \frac{36}{49} a_1$

which leads to $\frac{1296}{2401} \cdot (\frac{49}{36}) = (\frac{49}{36})(\frac{36}{49})$ or $a_1 = \frac{36}{49}$

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

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

$\text{solve}\left(\frac{1296}{2401} \cdot r^3 = \frac{279936}{823543}, r\right)$	$r = \frac{6}{7}$
$\text{solve}\left(\frac{36}{49} \cdot a = \frac{1296}{2401}, a\right)$	$a = \frac{36}{49}$

Problem 15

	A seq_1	B
=		
1	84	
2	105	
3	126	
4	147	
5	168	
6	189	
7	210	

A1 84

84 +105 +126 +147 +168 +189 +210 +231 +252 + 273 +294 +315 +336 +357 +378 +399 +420

this is the sum of the following arthimetic sequence

{84,105,126,147,168,189,210,231,252,273,294,315,336,357,378,399,420,441

Method 1: count terms (this is n) n =18

add first and last terms

First term (a_1) = 84 Last term (a_{17})=420

Sum of first and last term 84 + 420 =525

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

(18 /2)(84 +441)=9 (525)=4725

$$\sum_{n=1}^{18} 84 + (n-1)(21) = 4725$$ *This is how Riemann would have applied*

Problem 16

	A seq_1	B
=		
1	32/243	
2	64/729	
3	128/2187	
4	256/6561	
5	512/196...	
6	1024/59...	

A1 $\frac{32}{243}$

$$\frac{32}{243}+\frac{64}{729}+\frac{128}{2187}+\frac{256}{6561}+\frac{512}{19683}+\frac{1024}{59049}+\frac{2048}{177147}$$

this is the sum of the following geometric sequence

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

Method 1: Count terms (this is n) n =8

Determine a_1 and r First term (a_1) = $\frac{32}{243}$ r=$\frac{2}{3}$

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

$$S_8 = \frac{32}{243} \cdot [(1-(\frac{2}{3})\text{^}8)/(1-\frac{2}{3})] = \frac{201760}{531441}$$

$$\sum_{n=1}^{8} \frac{32}{243}\left(\frac{2}{3}\right)^{(n-1)} = \frac{201760}{531441}$$

This is how Riemann would have applied

0.379647035137

sum(seq(21·n,n,4,22,1))	5187
sum(seq(21·n,n,4,22,1))	5187
seq(21·n,n,4,22,1)	{84,105,126,147,168,189,210,231,252,273,294,315,336,357,378,399,420,441,462}
sum(seq(21·n,n,4,21,1))	4725

	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

$101\cdot 900\cdot 10^{2-2}$	90900
$87+15\cdot 2^{2-2}$	102
$102+15\cdot 2^{3-2}$	132
$132+15\cdot 2^{4-2}$	192
$192+15\cdot 2^{5-2}$	312
$312+15\cdot 2^{6-2}$	552
$552+15\cdot 2^{7-2}$	1032
$1032+15\cdot 2^{8-2}$	1992

$4050000+10800000\cdot\left(\frac{11}{3}\right)^{n-2}$	$\frac{97200000\cdot\left(\frac{11}{3}\right)^{n}}{121}+4050000$
$4050000+10800000\cdot\left(\frac{11}{3}\right)^{2-2}$	14850000
$14850000+10800000\cdot\left(\frac{11}{3}\right)^{4-2}$	160050000