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 $a_n = 275 + (n-1)(^{-}6.5)$

$a_{1000} = 275 + (1000-1)(^{-}6.5)$

$= {}^{-}6218.5$

$S_{1000} = (1000/2)[275 + {}^{-}6218.5]$

$= {}^{-}2971750.$

$= {}^{-}2.97175\text{E}6$ (scientific notation)

infinite sum $-\infty$

$$\sum_{n=1}^{1000} 275 + (n-1)(^{-}6.5) = {}^{-}2.97175\text{E}6$$

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 $a_n = 1826 + (n-1)(2.4)$

$a_{85} = 1826 + (85-1)(2.4)$

$= 2027.6$

$S_{85} = (85/2)[1826 + 2027.6]$

$= 163778.$

infinite sum ∞

$$\sum_{n=1}^{85} 1826 + (n-1)(2.4) = 163778.$$

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

$$S_{26} = \frac{1-\left(\frac{7}{13}\right)^{26}}{1-\frac{7}{13}} = \frac{611555472038588526737635402400}{7056410014866816666030739693} \approx 86.6667$$

$$S_{9} = \frac{1-\left(\frac{7}{13}\right)^{9}}{1-\frac{7}{13}} = \frac{70427638440}{815730721} \approx 86.3369$$

$$S_{26} - S_{9} = \frac{2327107312779470308854457880}{7056410014866816666030739693} \approx 0.3298$$

$$n\_1 \quad \sum_{n=10}^{26} 40\left(\frac{7}{13}\right)^{n-1} = \frac{2327107312779470308854457880}{7056410014866816666030739693} \approx 0.3298$$

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 $a_n = 472 + (n-1)(-3.2)$

$a_{58} = 472 + (58-1)(-3.2) = 289.6$

$S_{58} = (58/2)[472 + 289.6] = 22086.4$

$a_{28} = 472 + (28-1)(-3.2) = 385.6$

$S_{28} = (28/2)[472 + 385.6] = 12006.4$

$S_{58} - S_{28} = 22086.4 - 12006.4 = 10080.$

Infinite Sum $= -\infty$

$$\sum_{n=29}^{58} 472 + (n-1)(-3.2) = 10080.$$

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 $a_n = 8400 + (n-1)(24)$

$a_{17} = 8400 + (17-1)(24)$

$= 8784$

$S_{17} = (17/2)[8400 + 8784]$

$= 146064$

infinite sum ∞

$$\sum_{n=1}^{17} 8400 + (n-1)(24) = 146064$$

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

$$a_n = 1400\left(\frac{8}{7}\right)^{n-1}$$

$$S_9 = \frac{1-\left(\frac{8}{7}\right)^9}{1-\frac{8}{7}} = \frac{18772824200}{823543} \approx 22795.1961$$

$$\sum_{n=1}^{9} 1400\left(\frac{8}{7}\right)^{n-1} = \frac{18772824200}{823543} \approx 22795.1961$$

infinite sum $+\infty$

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

$$a_n = 960\left(\frac{-8}{15}\right)^{n-1}$$

$$S_6 = \frac{1-\left(\frac{-8}{15}\right)^6}{1-\frac{-8}{15}} = \frac{30966208}{50625} \approx 611.6782$$

$$\sum_{n=1}^{6} 960\left(\frac{-8}{15}\right)^{n-1} = \frac{30966208}{50625} \approx 611.6782$$

$$\textit{infinite}\ \text{sum}\ \frac{14400}{23} \approx 626.086956522$$

Problem 8

	A	B	C	D	E	F	G	H
=								
1	a_1	98	differenc...	15	ratio	113/98		

A1 a_1

$\{98,113,143\}$

This is a recursive pattern The difference in 113 and 98 is 15

The difference in 143 and 113 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 = 98

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

a_1 ▸ 98

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

$a_4 = 143 + (15 + (4-2)(15)) = 143 + 45 = 188$

$a_5 = 188 + (15 + (5-2)(15)) = 188 + 60 = 248$

$a_6 = 248 + (15 + (6-2)(15)) = 248 + 60 = 323$

$a_7 = 323 + (15 + (7-2)(15)) = 323 + 90 = 413$

$a_8 = 413 + (15 + (8-2)(15)) = 413 + 105 = 518$

This is a "fancier" version a_1 = 98 $a_n = 98 + \sum_{1}^{n-1} (15 + (n-1)(15))$

Problem 9

TYPO

Problem 10

	A	B	C	D	E	F	G	H
=								
1	a_1	24300000	differenc…	⁻186300…	ratio	7/30		

A1 a_1

{24300000,5670000,1323000}

This is a geometric pattern The ratio is 5670000 divided by 24300000 is $\frac{7}{30}$

The ratio is 1323000 divided by 5670000 is $\frac{7}{30}$

a_1 = 24300000 $r = \frac{7}{30}$ $a_n = 24300000\left(\frac{7}{30}\right)^{n-1}$

$a_4 = 24300000\left(\frac{7}{30}\right)^{4-1} = 308700$ $a_5 = 24300000\left(\frac{7}{30}\right)^{5-1} = 72030$ $a_4 = 24300000\left(\frac{7}{30}\right)^{6-1} = 16807$

$a_9 = 24300000\left(\frac{7}{30}\right)^{9-1} = \frac{5764801}{27000} = 213.511148148$

Problem 11

	A	B	C	D	E	F	G	H
=								
1	a_1	88	ratio	31	diff	6		

A1 a_1

$\{88,2728,100936,4340248\}$

This is a recursive pattern The ratio between 2728 and 88 is 31 The ratio between 100936 and 2728 is 37 The ratio between 4340248 and 100936 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 = 88

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

a_1 ▸ 88

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

$a_5=4340248(31+(5-2)(6))=4340248[49]=212672152$

$a_6=212672152(31+(6-2)(6))=212672152+55=11696968360$

$a_7=11696968360+(31+(7-2)(6))=11696968360+61=713515069960$

$a_8=713515069960+(31+(8-2)(6))=713515069960+67=47805509687320$

$a_9=47805509687320+(31+(9-2)(6))=47805509687320+73=3489802207174360$

This is a "fancier" version a_1 = 88 $a_n=88+\prod^{n-1}(31+(n-1)(6))$

$88+186\cdot 2+2268$	2728
$2728+186\cdot 3+2268$	5554

Problem 12

	A	B	C	D	E	F	G	H
=								
1	a_1	6144	differenc...	33792	ratio	13/2		

A1 a_1

$\{6144,39936,259584\}$

This is a geometric pattern The ratio is 39936 divided by 6144 is $\frac{13}{2}$

The ratio is 259584 divided by 39936 is $\frac{13}{2}$

$a\_1 = 6144$ $r = \frac{13}{2}$ $a_n = 6144\left(\frac{13}{2}\right)^{n-1}$

$a_4 = 6144\left(\frac{13}{2}\right)^{4-1} = 1687296$ $a_5 = 6144\left(\frac{13}{2}\right)^{5-1} = 10967424$ $a_6 = 6144\left(\frac{13}{2}\right)^{6-1} = 71288256$

$a_{12} = 6144\left(\frac{13}{2}\right)^{12-1} = 5376481182111$

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 $a_{17}=288$ 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 $a_{13}=a_1+(13-1)d$ or $-960=a_1+12d$

so $a_{17}=a_1+(17-1)d$ or $288=a_1+16d$

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	-960	
2	a_15	288	
3			
4			
5			
6			
7			
8			
9			
10			
11			

A1 *a_5*

$a_{17}-a_{13}$ implies $288--960=1248$

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

This allows us to find "d" $1248=4d$

$1248/4=4d/4$

$312=\mathbf{d}$

We can now use either $-960=a_1+12d$ or $288=a_1+16d$ to find a_1

$-960=a_1+12(312)$ leads to $-960=a_1+3744$ or $a_1=-960-3744=-4704$

$288=a_1+16(312)$ leads to $288=a_1+4992$ or $a_1=288-4992=-4704$

so our arithmetic sequence is $a_n=-4704+(n-1)(312)$

and our finite sequence is

$\{-4704,-4392,-4080,-3768,-3456,-3144,-2832,-2520,-2208,-1896,-1584,-1272,-96$

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

A1 *given_term1*

So we know $a_2=\frac{279936}{823543}$ and $a_7=\frac{1296}{2401}$ 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 $a_2=a_1 r\verb|^|(6-1)$ or $\frac{279936}{823543}=a_1\cdot r^5$

so $a_7=a_1 r\verb|^|(9-1)$ or $\frac{1296}{2401}=a_1\cdot r^8$

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	a_2	279936/...	
2	a_7	1296/24...	
3			
4			
5			
6			
7			
8			
9			
10			
11			

A1 *a_2*

a_9/a_6 implies $\frac{1296}{2401} / \frac{279936}{823543} = \frac{343}{216}$

a_9/a_6 implies $a_1 \cdot r^8 / a_1 \cdot r^5 = r^3$

This allows us to find "r" $r^3 = \frac{343}{216}$ 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 $\frac{279936}{823543} = a_1 \cdot r^5$ to find a_1

$\frac{279936}{823543} = a_1 (\frac{7}{6})$^5 which leads to $\frac{279936}{823543} = \frac{16807}{7776} a_1$

which leads to $\frac{279936}{823543} \cdot (\frac{7776}{16807}) = (\frac{7776}{16807})(\frac{16807}{7776})$ or $a_1 = \frac{2176782336}{13841287201}$

so our geometric sequence is $a_n = \frac{2176782336}{13841287201} (\frac{7}{6})$^(n−1)

and our finite sequence is

$$\left\{ \frac{2176782336}{13841287201}, \frac{362797056}{1977326743}, \frac{60466176}{282475249}, \frac{10077696}{40353607}, \frac{1679616}{5764801}, \frac{279936}{823543}, \frac{46656}{117649}, \frac{7776}{16807}, \frac{1296}{2401} \right\}$$

$\frac{7}{6.}$ ▸ 1.16666666667

1.·a_1 ▸ 0.157267333911

Problem 15

	A seq_1
=	
1	105
2	126
3	147
4	168
5	189
6	210
7	231

A1 105

$105 + 126 + 147 + 168 + 189 + 210 + 231 + 252 + 273 + 294 + 315 + 336 + 357 + 378 + 399 + 420 + 441$

this is the sum of the following arthimetic sequence

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

Method 1: count terms (this is n) n =17

add first and last terms

First term (a_1) = 105 Last term (a_{17})=441

Sum of first and last term 105 + 441 =546

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

17

$$\sum_{n=1}^{17} 105 + (n-1)(21) = 4641$$ *This is how Riemann would have applied*

Problem 16

	A seq_1
=	
1	64/729
2	128/2187
3	256/6561
4	512/196...
5	1024/59...
6	2048/17...

A1 $\frac{64}{729}$

$\frac{64}{729} + \frac{128}{2187} + \frac{256}{6561} + \frac{512}{19683} + \frac{1024}{59049} + \frac{2048}{177147} + \frac{4096}{531441}$

this is the sum of the following geometric sequence

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

Method 1: Count terms (this is n) n =7

Determine a_1 and r First term (a_1) = $\frac{64}{729}$ $r=\frac{2}{3}$

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

$S_7 = \frac{64}{729} \cdot (1-(\frac{2}{3})\text{^}7 / (1-\frac{2}{3}) = a\_1 \cdot \frac{1-r\_1^{n\_1}}{1-r\_1} = \frac{131776}{531441}$

$$\sum_{n=1}^{7} \frac{64}{729}\left(\frac{2}{3}\right)^{(n-1)} = \frac{131776}{531441}$$

This is how Riemann would have applied

1.0p 0.247959792338

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