Problem 1

$\{11,18,25,32\}$

Next three terms $\{11,18,25,32,39,46,53\}$

Note: $32-25=7$

$25-18=7$

$18-11=7$

This means that this sequence can be written as an arithmetic sequence

$d=7$

$a_1=11$

Arithmetic Sequence $a_n=a_1+(n-1)d$

$=11+(n-1)(7)$

Explicit Form of this Sequence

$a_n=11+7n-7$

$a_n=4+7n$

	A seq_1	B
=		
1	11	
2	18	
3	25	
4	32	
5		
6		
7		
8		
9		
10		
11		

A1 11

finding a_{100} given that $a_n = 11 + (n - 1)(7)$

$$a_{100} = 11 + (100 - 1)(7)$$

$$= 704$$

finding a_{100} given that $a_n = 4 + 7n$

$$a_{100} = 4 + (7)(100)$$

$$= 704$$

now you CAN write an arithmetic sequence as a recursive sequence, but arithmetic is easier!

$a_1 = 11$

$a_{n+1} = a_n + 7$

Problem 2

$\{729,243,81,27\}$ Including the next three terms $\{729,243,81,27,9,3,1\}$

Note: $\dfrac{243}{729}=\dfrac{1}{3}$ $\quad \dfrac{81}{243}=\dfrac{1}{3}$ $\quad \dfrac{27}{81}=\dfrac{1}{3}$

This means that this sequence can be written as a geometric sequence

$r=\dfrac{1}{3}$ $\quad a_1=729$ $\quad$ Geometric Sequence $a_n=a_1\cdot r^{n-1}$

$$=729\cdot\left(\frac{1}{3}\right)^{n-1}$$

Explicit Form of this Sequence

$$a_n=729\cdot\left(\frac{1}{3}\right)^{n-1}$$

$$a_n=3^6\cdot\left(3^{-1}\right)^{n-1}$$

$$=3^6\cdot\left(3^{-n+1}\right)$$

$$=3^{-n+7}=2187\cdot 3^{-n}$$

	A seq_1	B
=		
1	729	
2	243	
3	81	
4	27	
5		
6		
7		
8		
9		
10		
11		

A1 729

finding a_9 given that $a_n=729\left(\frac{1}{3}\right)^{n-1}$

$$a_9=729\left(\frac{1}{3}\right)^{9-1}$$

$$=729\left(\frac{1}{3}\right)^{8}$$

$$=\frac{729}{6561}=\frac{1}{9}$$

now you CAN write an geometric sequence as a recursive sequence, but geometic is easier!

$$a_1 = 729$$

$$a_{n+1} = \frac{1}{3} a_n$$

$$\left\{\frac{1}{3},\frac{-1}{9},\frac{1}{27},\frac{-1}{81}\right\}$$

Including the next three terms $\left\{\frac{1}{3},\frac{-1}{9},\frac{1}{27},\frac{-1}{81},\frac{1}{243},\frac{-1}{729},\frac{1}{2187}\right\}$

Note: $\dfrac{\frac{-1}{9}}{\frac{1}{3}}=\dfrac{-1}{3}$ $\dfrac{\frac{1}{27}}{\frac{-1}{9}}=\dfrac{-1}{3}$ $\dfrac{\frac{-1}{81}}{\frac{1}{27}}=\dfrac{-1}{3}$

This means that this sequence can be written as a geometric sequence

r = $\dfrac{-1}{3}$ $a_1=\dfrac{1}{3}$ Geometric Sequence $a_n=a_1\cdot r^{n-1}$

$$=\frac{1}{3}\cdot\left(\frac{-1}{3}\right)^{n-1}$$

	A seq_1	B
=		
1	1/3	
2	-1/9	
3	1/27	
4	-1/81	
5		
6		
7		
8		
9		
10		

A1 $\frac{1}{3}$

finding a_{10} given that $a_n = \frac{1}{3}\left(\frac{-1}{3}\right)^{n-1}$

$$a_{10} = \frac{1}{3}\left(\frac{-1}{3}\right)^{10-1}$$

$$= \frac{1}{3}\left(\frac{-1}{3}\right)^{9}$$

$$= \frac{-1}{59049}$$

now you CAN write an geometric sequence as a recursive sequence, but geometic is easier!

$$a_1 = \frac{1}{3}$$

$$a_{n+1} = \frac{-1}{3} a_n$$

Problem 4

$\{7,9,12,16,21\}$ Including the next three terms $\{7,9,12,16,21,27,34,42\}$

Note: $\frac{9}{7}=\frac{9}{7}$ $\frac{12}{9}=\frac{4}{3}$ $\frac{16}{12}=\frac{4}{3}$ $\frac{21}{16}=\frac{21}{16}$

Note: $9-7=2$ $12-9=3$ $16-12=4$ $21-16=5$

So this does not have a common ratio or a common difference

This means that this sequence cannot be written as a geometric or an arithmetic sequence

So we must write a different type of sequence, recursive sequence

$a_1=7$

$a_{n+1}=n+1+a_n$ (this means add the number of term plus 1 to the previous term)

	A	B	C	D	E	F	G
1		a1	a2	a3	a4	a5	
2	a_n	7	9	12	16	21	

A1

D2 =d1+