3.

a) $a_0=2, a_1=3, a_2=5, a_3=9$
b) $a_0=1, a_1=4, a_2=27, a_3=256$
c) $a_0=0, a_1=0, a_2=1, a_3=1$
d) $a_0=0, a_1=1, a_2=2, a_3=3$

4.

a) $a_0=1, a_1=-2, a_2=4, a_3=-8$
b) $a_0=3, a_1=3, a_2=3, a_3=3$
c) $a_0=8, a_1=11, a_2=33, a_3=71$
d) $a_0=2, a_1=0, a_2=16, a_3=0$

5.

a){2,5,8,11,14,17,20,23,26,29,32}
b){1,1,1,2,2,2,3,3,3,4}
c){1,1,3,3,5,5,7,7,9,9}
d){0,-1,-2,-2,8,88,656,4912,40064,362368}
e){6,12,24,48,96,192,384,768,1536,3072}
f){1,1,2,3,5,8,13,21,34,55}
g){1,2,2,3,3,3,3,4,4}
h){3,3,5,4,4,3,5,5,4,3}

7.

1- starting from one, the next element is double the value of the previous number.
2-starting with one and two, the next element equals the sum of the two numbers before plus one.
3-the sequence is the numbers non divisible by 3.

8.

1-even numbers starting from 33
2-odd prime numbers.
3-starting with 3, each element equals the element before +3.

9.

a) one one and one zero, two one’s two zero’s,…
b) the set of natural numbers, where every even number is repeated twice.
c) every 2^i ,else is zero
d) $3*2n-1$
e)stating with 15, every number equals the pervious number – 7
f) starting with 3, the nth number = (i_{n-1})+(2+i)
g) $2n^3$, h) n!+1

10.
a) $2+n^2$, 123, 146,171
b) $4n+3$, 50,57,64
c)conversation to binary , 1100,1101,1110

d)sequance of numbbers nondivisible by 4, and every number is rebeated by odd numbers, 6,6,6

e) $a_n=3^{n-1}-1$

f)…can’t find a pattern

g)starting with one one, then two zeros’s,then three one’s,and so on, 0,0,0

h)every number is the square of the number before it.

13.

a)20
b)11
c) 30
d) 511

14.

a) 16
b) 84
c) 1.6761904
d) 4

21.

from 19:

$$\sum_{i=1}^{n}(a_i-a_{j-1})=a_n-a_0$$

and since $k^2-(k-1)^2=2k-1$

using the property before $a_n=k^2$

$$\sum_{k=1}^{n}(a_k-a_{k-1})=a_n-a_0$$

= k^2-0

= k^2 #

for 2k-1 $\sum_{k=1}^{n}(2k-1)=n^2$

$$2\sum_{k=1}^{n}(k)-\sum_{k=1}^{n}(1)=n^2,2\sum_{k=1}^{n}(k)-n=n^2$$

$2\sum_{k=1}^{n}(k)=n^2+n$ = $\sum_{k=1}^{n}(k)=\frac{n^2+n}{2}$ #

22.

noting that $k^3-(k-1)^3=3k^2-3k+1$

$3\sum_{k=1}^{n}(k^2)-3\sum_{k=1}^{n}(k)+\sum_{k=1}^{n}(1)$ = $3\sum_{k=1}^{n}(k^2)-3(\frac{n^2+n}{2})+n$ = n^3

$\sum_{k=1}^{n}(k^2)=3(\frac{n^2+n}{2})-n+n^3$ ~~~ leading to $\sum_{k=1}^{n}(k^2)=\frac{(n^2+n)(2n+1)}{6}$

27.
a) 0
b)1680
c)-1
d)1024

28.
$\prod n$

31.
a) countable -1, -2, -3, …
b) countable 2, 4, 6, …
c) uncountable
d) countable 7,14,21,38,45

32.
a) countable 11, 12, 13, …
b) countable 1, 3, 5, …
c) uncountable
d) countable 10, 20, 30, …

36.
suppose we have a set A and b is a subset of A, A elements can be listed as $a_1, a_2, a_3, ..$ for b $|b| \leq |A|$ and since b is countable, then mapping b to A is doable since the $|b| \leq \aleph_0$ because its countable, thus A is countable.

37.
for $A \subseteq B$ since listing the elements of A is uncountable, and $|A| \leq |B|$ leading to that $|A| \leq \aleph_0$,thus A is impossible to count.