1. Give an example of the smallest infinity.

The smallest infinity is natural infinity this includes the countabl numbers like 1, 2, 3, 4...

✓

2. (2 pts) There are 118 elements on the periodic table. We can think of the periodic table as a set containing 118 elements (which are actually elements!:). What's the size of its power set?

There are 2^{118} elelements or peices in the Power Set.

✓

3. Describe the Hilbert Hotel.

Hilbert hotel is an infinent hotel ready for all of Your infinant needs. At the hilbert hotel they go above and beyond, moving and making space for new residents. The flexibility of the hotel is a slight scam though. Because of the hotels infinant nature it reqauires staying residents move rooms when new residents arrive.

Nice

4. Which set is bigger – the natural numbers or the even natural numbers?

They are the same size of infinity.

✓

1. Give an example of the smallest infinity.

an example of the smallest infinity is the countable infinity, which is the natural #'s.

example: 1, 2, 3, 4, 5, ... ~~∞~~

✓

2. (2 pts) There are 118 elements on the periodic table. We can think of the periodic table as a set containing 118 elements (which are actually elements!:). What's the size of its power set?

2^{118} is the cardinality of the Power set. The P(S) size is bigger than the subset

? is a number that have a 1-1 correspondance

The calculator said $2^{118} = 3.3230699884462e35$

3. Describe the Hilbert Hotel.

The Hilbert Hotel is an infinite hotel that can hold all but the power sets as they are too big. (no 1-1 correspondence). We can do this by producing an element of P(S) that is not on the list of infinite guests on infinite busses.

good

4. Which set is bigger – the natural numbers or the even natural numbers?

They are the same size, bc you can make a 1-1 correspondance between them!

✓

$\mathbb{N}$		S
1	$\leftrightarrow$	2
2	$\leftrightarrow$	4
3	$\leftrightarrow$	6
4	$\leftrightarrow$	8
⋮		

5. Pascal's triangle floats on a sea of what?

ZEROES

✓

6. (2 pts) Given the set A of artists: $\{Prince, Nirvana, TheB52s\}$ (denote them $\{P, N, B\}$). Write down the power set of A, $P(A)$.

✓

$$\{\underbrace{\{\}}_{1}, \underbrace{\{P\}, \{N\}, \{B\}}_{3}, \underbrace{\{P,N\}, \{P,B\}, \{N,B\}}_{3}, \underbrace{\{P,N,B\}}_{1}\}$$

7. (2 pts) Three infinite school buses show up to the Hilbert Hotel. Luckily it's empty: how do we slide them in?

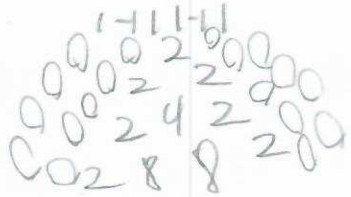
BUS 1	H	BUS 2	H	BUS 3	H
1	3	1	2	1	1
2	6	2	5	2	4
3	9	3	8	3	7
4	12	4	11	4	10
⋮	⋮	⋮	⋮	⋮	⋮

$n \to n \cdot 3$ $\qquad$ $n \to (n \cdot 3) - 1$ $\qquad$ $n \to (n \cdot 3) - 2$

✓ good!

5. Pascal's triangle floats on a sea of what?

A Sea of zeros



6. (2 pts) Given the set A of artists: $\{Prince, Nirvana, TheB52s\}$ (denote them $\{P, N, B\}$). Write down the power set of A, $P(A)$.

A	$P(A)$
$\{P,N,B\}$	$\{\}, \{P\}, \{N\}, \{B\}, \{P,N\}, \{P,B\}, \{N,B\}, \{P,N,B\} = 8$

7. (2 pts) Three infinite school buses show up to the Hilbert Hotel. Luckily it's empty: how do we slide them in?

You assign each bus (B) a number and each Seat (S) a number. Then, using the formula $2^b 3^s$ we can be sure nobody is getting the same room since the powers of 2 and the powers of 3 do not overlap. This does mean rooms like #6 will be empty however.

good

5. Pascal's triangle floats on a sea of what?

It floats on a sea of multiples of ~~2~~. (1/8, 1/4, 1/2, 1, etc.)

0s

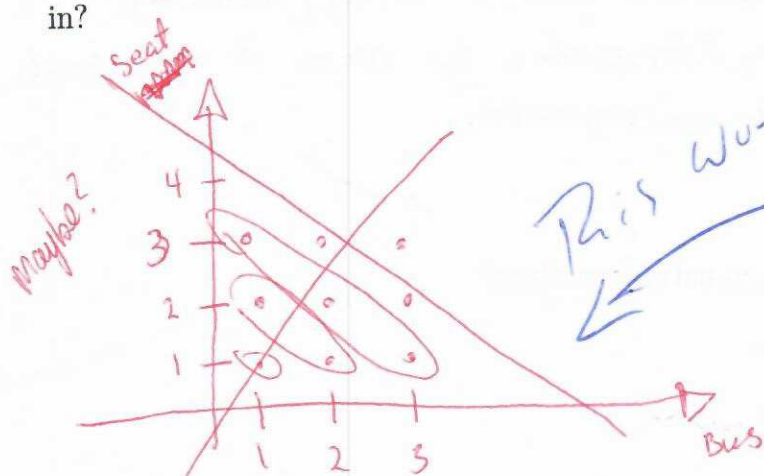
6. (2 pts) Given the set A of artists: $\{Prince, Nirvana, TheB52s\}$ (denote them $\{P, N, B\}$). Write down the power set of A, $P(A)$.

3 artists

$\{1,2,3\}$ $\{\{\ \}, \{1\}, \{2\}, \{3\}, \{1,2\}, \{1,3\}, \{2,3\}, \{1,2,3\}\}$

$8 = 2^3$

7. (2 pts) Three infinite school buses show up to the Hilbert Hotel. Luckily it's empty: how do we slide them in?



This works!

IN		S
1	$\leftrightarrow$	3
2	$\leftrightarrow$	6
3	$\leftrightarrow$	9
⋮		⋮

$\boxed{\text{Rule} = n \to 3n}$

another great idea!

Bus 1: $n \to 3n$

Bus 2: $n \to 3n+1$

Bus 3: $n \to 3n+2$

5. Pascal's triangle floats on a sea of what?

Pascal's triangle has a sea of zeros around it.

6. (2 pts) Given the set A of artists: $\{Prince, Nirvana, TheB52s\}$ (denote them $\{P, N, B\}$). Write down the power set of A, $P(A)$.

$$\overbrace{\{\{\}, \{P\}, \{N\}, \{B\}, \{P,N\}, \{N,B\},}^{P(A)}$$
$$\{B,P\}, \{P,N,B\}\}$$

7. (2 pts) Three infinite school buses show up to the Hilbert Hotel. Luckily it's empty: how do we slide them in?

We put them in the rooms using the Primes.
Bus 1 = 1st prime; Bus 2 = 2nd prime, Bus 3 = 3rd Prime.

Nice!

For example

Bus 1	Bus 2	Bus 3
$1 \longleftrightarrow 2^1$	$1 \longleftrightarrow 3^1$	$1 \longleftrightarrow 5^1$
$2 \longleftrightarrow 2^2$	$2 \longleftrightarrow 3^2$	$2 \longleftrightarrow 5^2$
$3 \longleftrightarrow 2^3$	$3 \longleftrightarrow 3^3$	$3 \longleftrightarrow 5^3$
$4 \longleftrightarrow 2^4$	$4 \longleftrightarrow 3^4$	$4 \longleftrightarrow 5^4$
$\vdots$	$\vdots$	$\vdots$