Hilbert Grand Hotel!

(1) Set of all ints is countable: Watched video

0, 1, -1, 2, -2, 3, -3, 4, -4, ...
↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓
1 2 3 4 5 6 7 8 9 ....

(2) $\frac{1}{1}$ - $\frac{1}{1}$ list all ration nums Watched video
do zigsak

$\frac{2}{1}$ $-\frac{2}{1}$

$\frac{3}{1}$ $-\frac{3}{1}$

...

0 → start w/ 0 go to $\frac{1}{1}$ and do zigsak

(35) Power Set of 3 nums: {empty set}

{1,2,3}

{2} {3} {1}

{1,3} {1,2} {2,3}

{1,2,3}

{} subset

infinite num of pos. integers:

1, 2, 3, 4, 5, ...

	1	2	3
1 ↔	N	N	N
2 ↔	Y	N	N
3 ↔	N	Y	N
4 ↔	Y	Y	N
5 ↔	Y	N	Y

6 ↔ Y N Y

7 ↔ N Y Y

8 ↔ Y Y Y

countable

$\{1, 2, 3, 4, 5, 6, 7, \ldots\}$

1 ↔ (N) Y N N N N N ...
2 ↔ N (N) N N N N N ...
3 ↔ Y Y (Y) Y Y Y Y ...
4 ↔ N Y N (N) N Y N ...
Y Y N N ....

there's subset that is not listed

$|S| < |P(S)| < |P(P(S))|$

uncount infinite

Power Set of Set is countably infinite

(1) Hilbert Motel 1:57 - 3:11

Motel

	1	2	3	4	5	6	...
	G1	G2	G3	G4	G5	G6	...
B1	B1S1	B1S2	B1S3	B1S4	...		
B2	B2S1	B2S2					
B3	B3S1	B_3S_2					
B4	B4S1	$B_4^3S_2$					
...							

Idea: How to list all of ration or pos ratio numbers - zigzak approach

(2) No, you can't fit them - Uncountably infinite

1 ↔ A A A A A A ...
2 ↔ A B A B A B ...
3 ↔ A B B A A A ...
4 ↔ ...

counters diagonalization BAA ... - do for all another person that's not