CSE 380 **Discrete Mathematics II**

Cantor Diagonalization

13 January 2021 *Learn About*

The Table

	1	**2**	**3**	**4**	**5**	.	.	.
1	3	1	4	1	5	.	.	.
2	2	7	1	8	2	.	.	.
3	1	6	1	8	0	.	.	.
4	1	4	1	4	2	.	.	.
5	9	8	1	5	4	.	.	.
.	.	.	.	.	.			
.	.	.	.	.	.			
.	.	.	.	.	.			

The Crux

The proof by contradiction depends on one key assumption:

The table is

"complete" — "finished" — "full".

In other words, it lacks nothing.

The Diagonal

	1	**2**	**3**	**4**	**5**	.	.	.
1	**3**	1	4	1	5	.	.	.
2	2	**7**	1	8	2	.	.	.
3	1	6	**1**	8	0	.	.	.
4	1	4	1	**4**	2	.	.	.
5	9	8	1	5	**4**	.	.	.
.	.	.	.	.	.			
.	.	.	.	.	.			
.	.	.	.	.	.			

Old and New

	1	**2**	**3**	**4**	**5**	.	.	.
1	**3**	1	4	1	5	.	.	.
2	2	**7**	1	8	2	.	.	.
3	1	6	**1**	8	0	.	.	.
4	1	4	1	**4**	2	.	.	.
5	9	8	1	5	**4**	.	.	.
.	.	.	.	.	.			
.	.	.	.	.	.			
.	.	.	.	.	.			

	1	**2**	**3**	**4**	**5**	.	.	.
1	**4**	1	4	1	5	.	.	.
2	2	**4**	1	8	2	.	.	.
3	1	6	**4**	8	0	.	.	.
4	1	4	1	**5**	2	.	.	.
5	9	8	1	5	**5**	.	.	.
.	.	.	.	.	.			
.	.	.	.	.	.			
.	.	.	.	.	.			

Characteristic Functions

of the Powerset of the Positive Integers:

	1	**2**	**3**	**4**	**5**	.	.	.
1	**0**	1	0	1	0	.	.	.
2	1	**0**	1	0	1	.	.	.
3	1	0	**1**	1	1	.	.	.
4	0	1	1	**0**	1	.	.	.
5	0	0	1	1	**0**	.	.	.
.	.	.	.	.	.			
.	.	.	.	.	.			
.	.	.	.	.	.			