GEOG 653: Lab 6 (Surface Analysis)

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Overview

For lab 6, we will explore Surface Analysis.

Question 1.

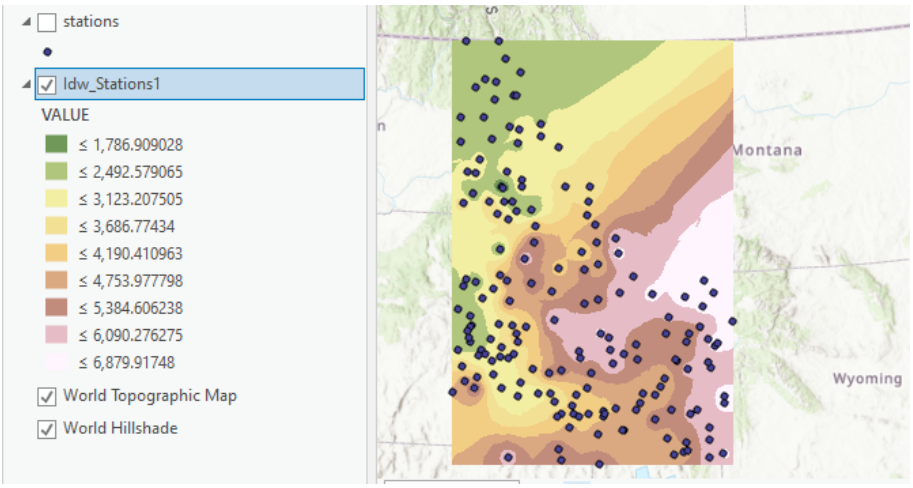


Figure 1: IDW Interpolation for "Stations" layer.

Question 2.

Minimum estimated value: **1,786.909**.
Maximum estimated value: **6,879.917**.
Range of original sample: **6880-995**.
The range of the estimated values is no larger than the range of the original sample points.

Question 3.

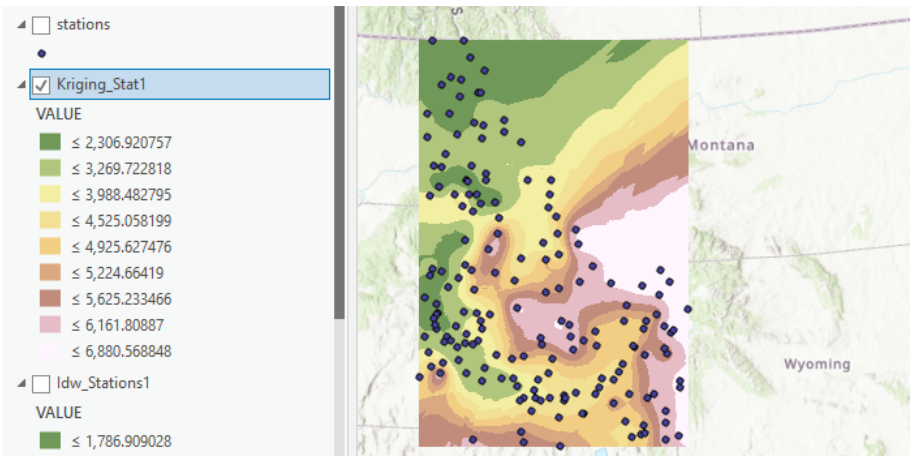


Figure 2: Kriging Interpolation for "Stations" layer.

Question 4.

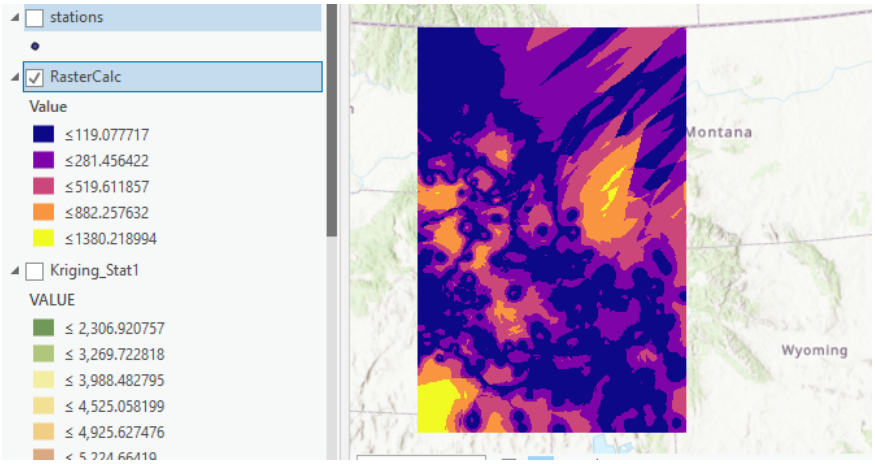


Figure 3: Raster calculation of absolute difference between IDW and Kriging method.

Question 5.

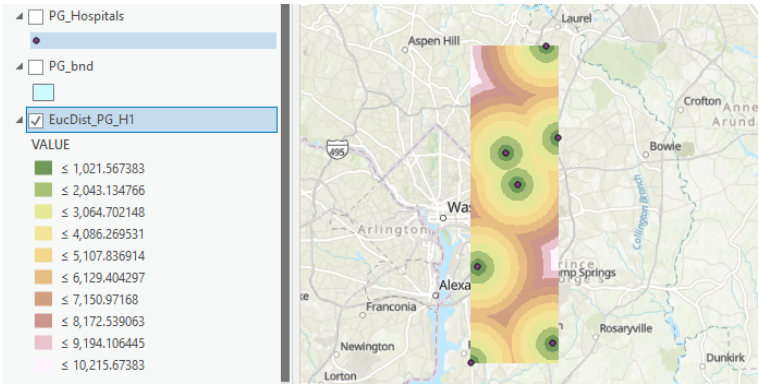


Figure 4: Euclidean distance calculation of PG County Hospitals.

Question 6.

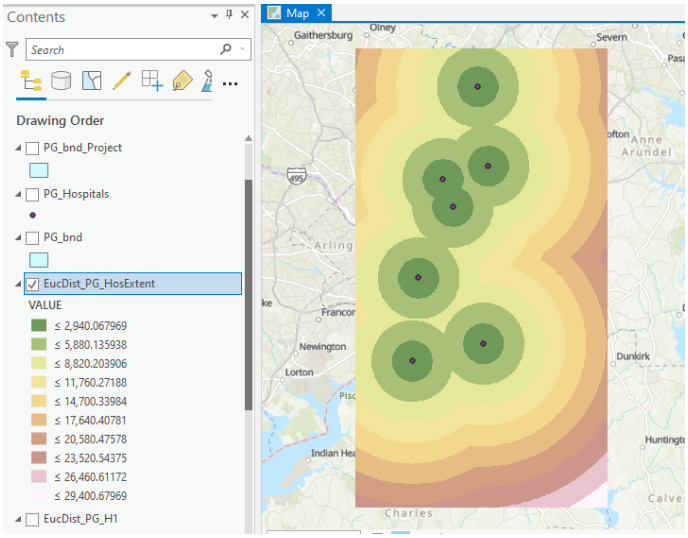


Figure 5: Euclidean distance calculation of PG County Hospitals (with extent of PG County Boundary).

Question 7.

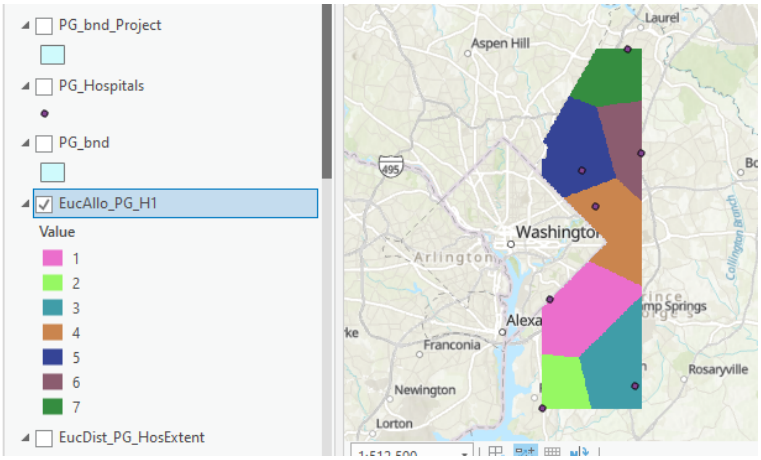


Figure 6: Allocation distance of PG County Hospitals (with PG County Boundary Mask).

Question 8.

Question 9.

Question 10.

Question 11.

Question 12.

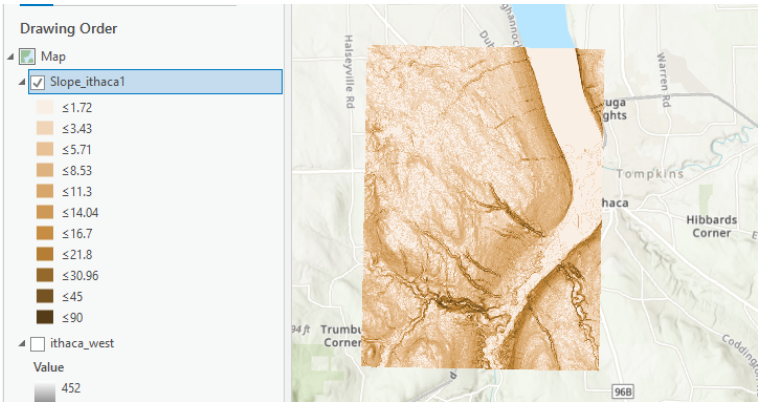


Figure 7: "Ithaca_West" Slope Output Raster.

Question 13.

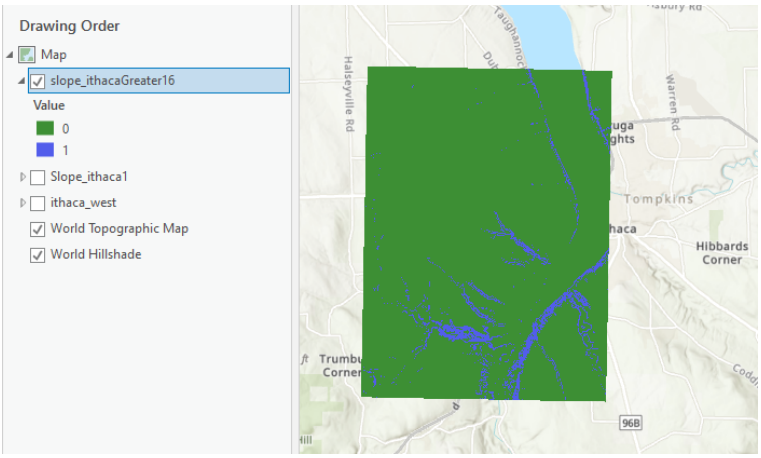


Figure 8: Slope Output Raster sequestered between values less than or greater than 16.

Question 14.

From the figure below we can see that the raster has a total of 69,487 cells with value 1, in our case the slope values which are greater than or equal to 16. Therefore we can make the calculation:

$$Area = 69,487 * cell\ area$$

Given that our cell sizes are 10x10m, the calculation becomes:

$$Area = 69,487 * 10 * 10 = 6,948,700\ m^2$$

OBJECTID	Value	Count
1	0	1353252
2	1	69487

Figure 9: Screenshot of Attribute Table Count.

Question 15.

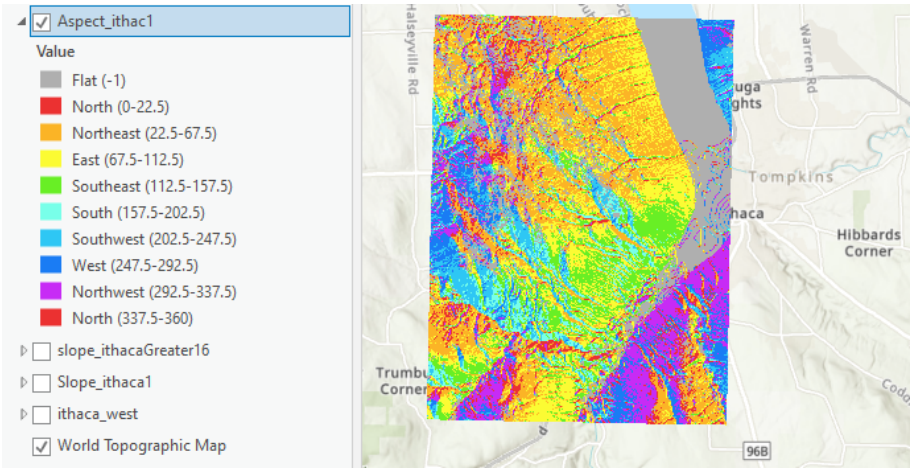


Figure 10: Aspect surface of Ithaca DEM.

Question 16.

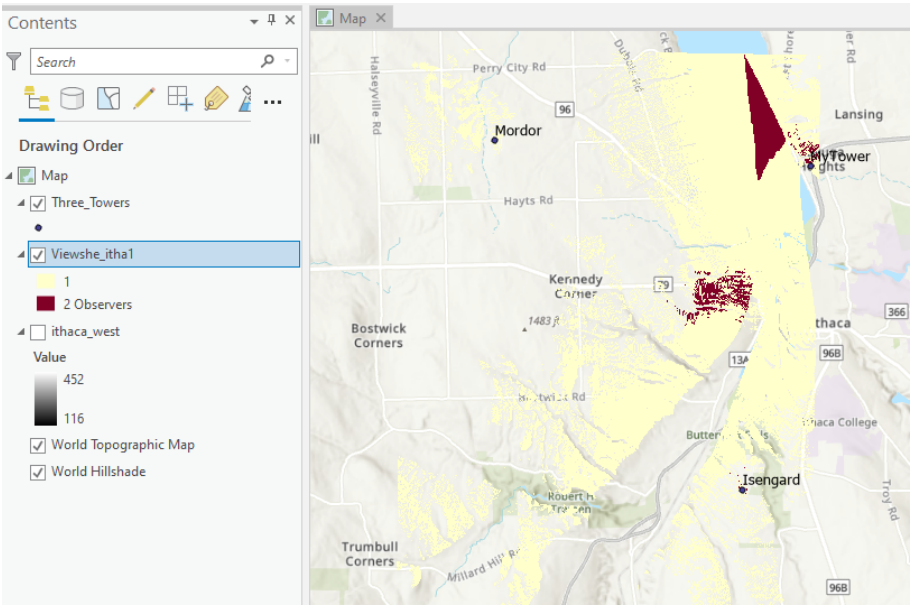


Figure 11: Viewshed Analysis with Tower Layer.

Question 17.

- A cell value of 1 means that it is observable to only 1 observer, however there is no discerning to which points those are.
- A cell value of 2 means that to an observer, 2 towers are observable.
- There is no value of 3 because as there are 3 towers, you cannot "observe" a tower which you are occupying, or more generally, you will always be facing away from a specific feature.

Question 18.

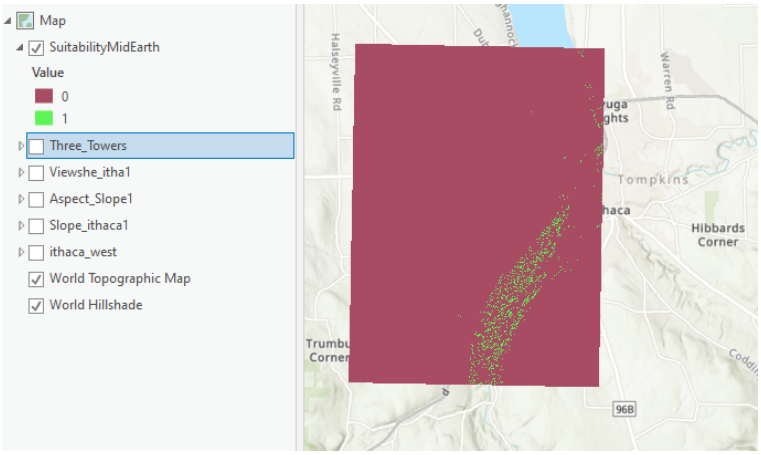


Figure 12: Suitability Analysis of "Middle Earth" layer, (Red: Unsuitable, Green: Suitable)

Question 19.

From the figure below we can see that the raster has a total of 18,783 cells with value 1, therefore we can make the calculation:

$$Area = 18,783 * 10 * 10 = 1,878,300\, m^2$$

OBJECTID	Value	Count
1	0	1399135
2	1	18783
Click to add new row.		

Figure 13: Screenshot of Attribute Table Count.

Question 20.

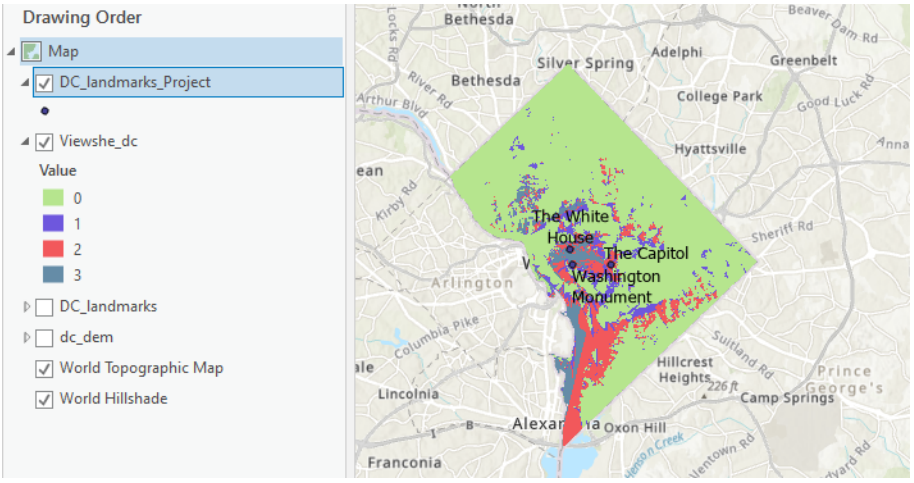


Figure 14: Viewshed analysis of DC Monuments

Question 21.

From the figure below we can see that the raster has a total of 86,182 cells with value 3, therefore we can make the calculation:

$$Area = 86,182 * 10 * 10 = 8,618,200\, m^2$$

OBJECTID	Value	Count
1	0	1379220
2	1	118581
3	2	190714
4	3	86182

Figure 15: Screenshot of Attribute Table Count.

Question 22.

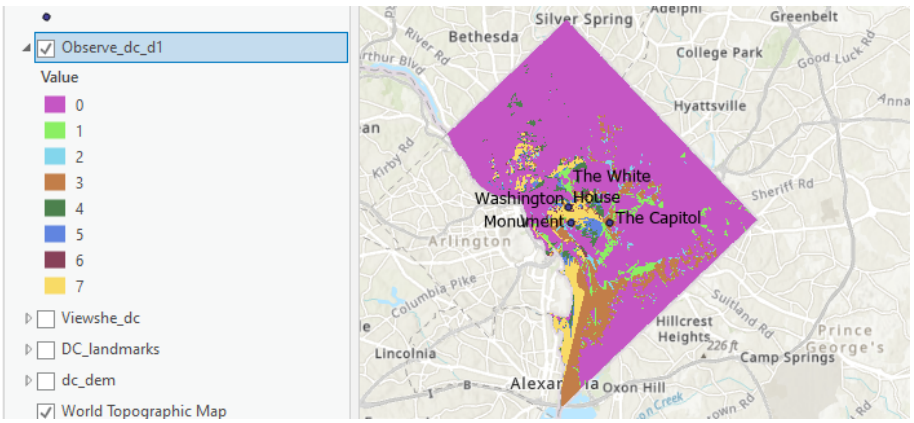


Figure 16: Observer Points Analysis.

Question 23.

There are 37,018 total cells that are visible only to the Capitol, therefore we can make the calculation:

$$Area = 37,018 * 10 * 10 = 3,701,800\ m^2\ or\ 3.7018\ km^2$$

There are 159,826 total cells that are visible to both the Washington Monument and the White House but not the Capitol, therefore we can make the calculation:

$$Area = 159,826 * 10 * 10 = 15,982,600\ m^2\ or\ 15.9826\ km^2$$

Question 24.

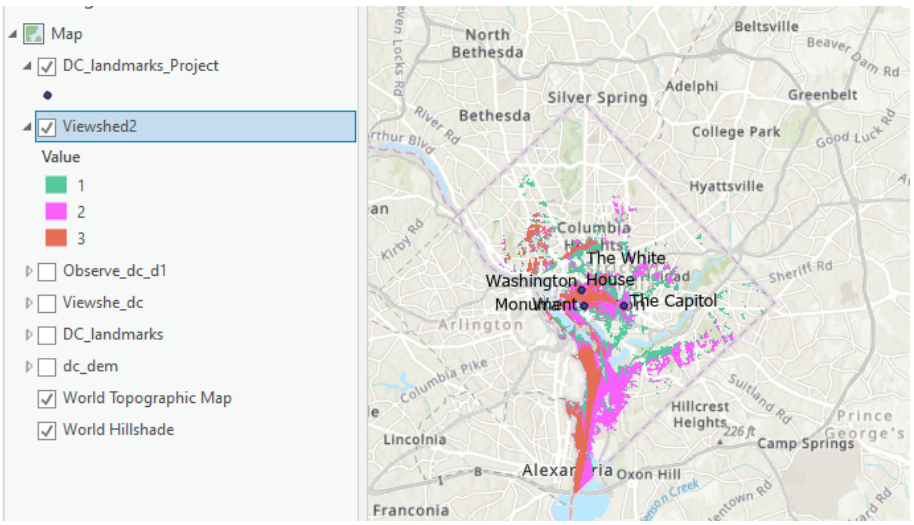


Figure 17: Viewshed2 analysis of DC Monuments

Question 25.

-A cell value of 1 means that it is observable to only 1 observer, however there is no discerning to which points those are.
- A cell value of 2 means that to an observer, 2 locations are observable.
-Unlike in regular viewshed, the additional variable of height allows us to observe all 3.

Question 26.

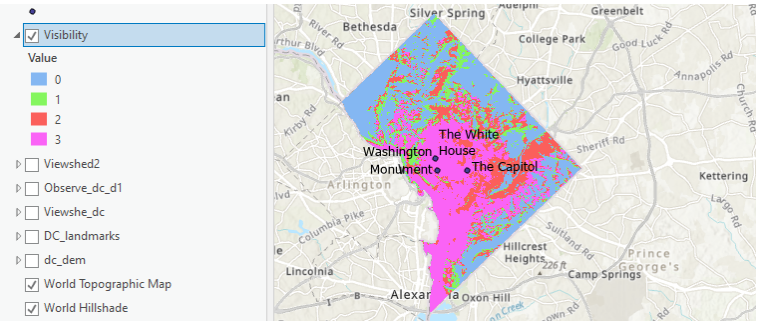


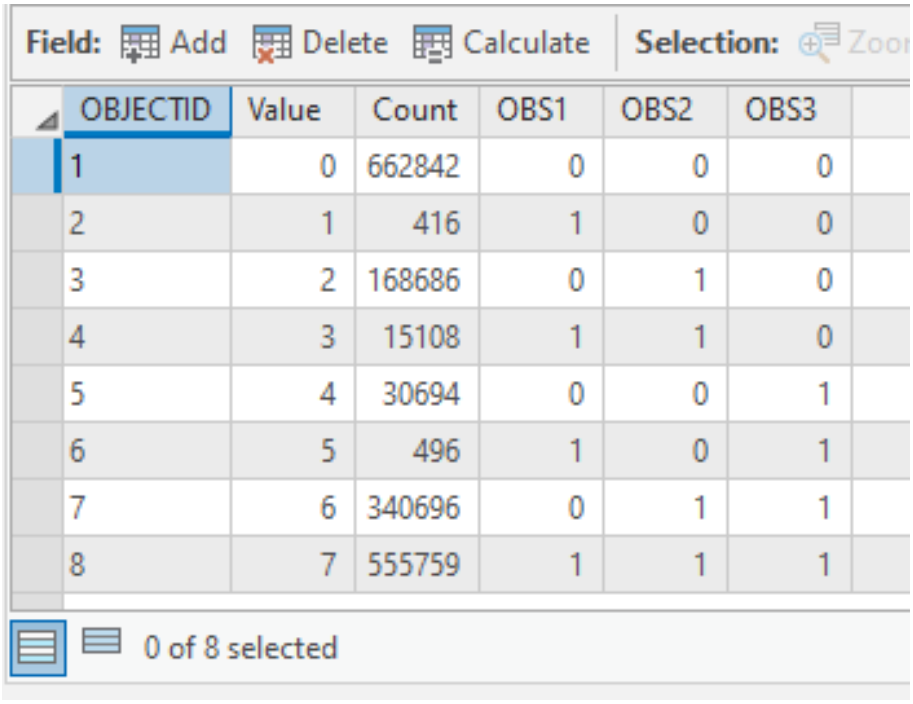
Figure 18: Visibility analysis with observer offset by Height (Frequency Analysis).

Question 27.

-A cell value of 1 means that it is observable to only 1 observer, however there is no discerning to which points those are.
- A cell value of 2 means that to an observer, 2 locations are observable.
- A cell value of 3 means that to an observer, 3 locations are observable.

Question 28.

From our output, we can see there are a few difference between questions 22 and 23. When we run the analysis by observers, we are identifying the features which are observable from the surface locations.



OBJECTID	Value	Count	OBS1	OBS2	OBS3
1	0	662842	0	0	0
2	1	416	1	0	0
3	2	168686	0	1	0
4	3	15108	1	1	0
5	4	30694	0	0	1
6	5	496	1	0	1
7	6	340696	0	1	1
8	7	555759	1	1	1

0 of 8 selected

Figure 19: Visibility analysis with observer offset by Height (Observer Analysis).