

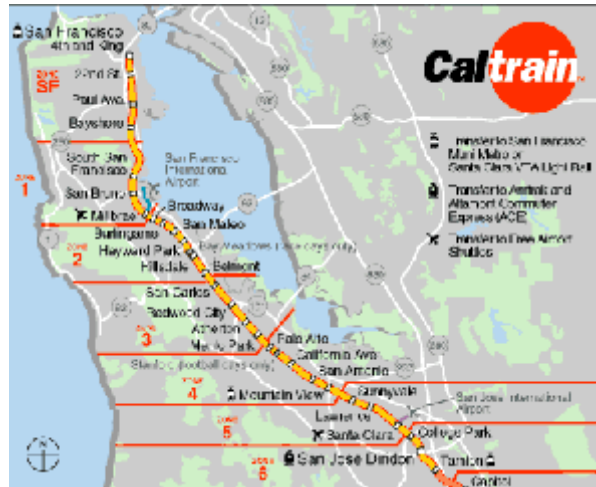
Name: _____

Directions (Part I): Answer any 10 of the following 12 questions. If you need more space, use the back of the paper. Each question in Part I is worth 6 points. [60]

1. A) What type of map is illustrated to the right?

B) Under what circumstances would you use a map of this type?

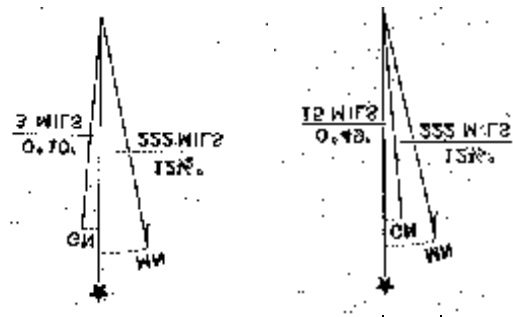
C) What *doesn't* this map show about the Bay Area? (Name at least three types of information missing from this map.)



Ques. 1

2. To the right are symbols found at the bottom of USGS topographic maps of two different locations in Arizona.

A) What does each line in these symbols depict?



Question 2

B) Why are these symbols different from each other?

3. To the right is a graphic of the outline of California, as added to this document by a word processing program.

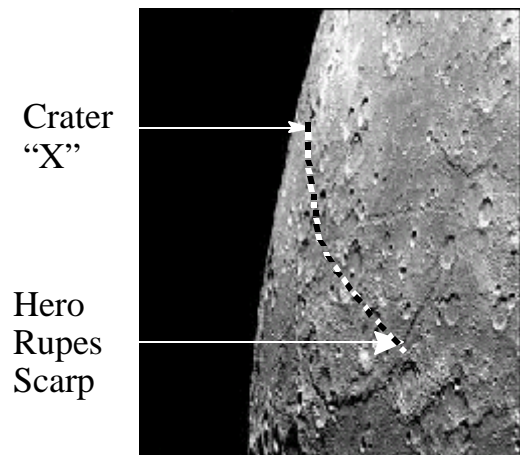
A) How is this graphic different from an outline map of California as added to an ArcView View window?

B) Describe three things we can do to an outline map in ArcView that we cannot do to this graphic.



Question 3

4. The image of Mercury was taken by Mariner 10 in 1974. It is known that the distance from “Crater X” to the Hero Rupes Scarp is 639 kilometers (indicated by the black/white dashed line). The two surface features are separated by an angular distance of 15E. Given this information, what is the circumference of Mercury? (*Show your work!*)

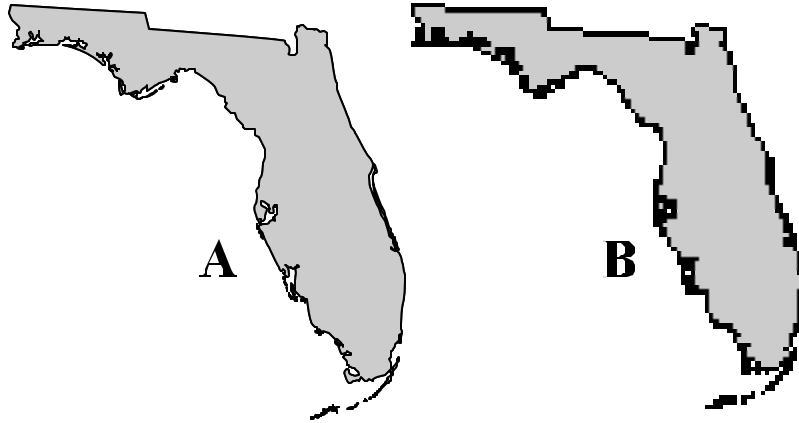


5. How can the Earth’s shape be defined? Describe two examples of references used for Earth’s shape.

6. You are producing a map that shows the population density of the contiguous 48 states. Since $\text{Population Density} = \frac{\text{Population}}{\text{Area}}$, what type of map projection would be most appropriate to illustrate the data?

7. The images (right) are digital representations of the state of Florida.

A) What is the difference between Figure A (left) and Figure B (right)? [In addition to providing the names of the spatial data structures used, give a brief description of each.]

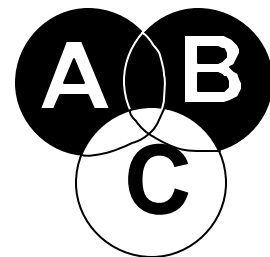


Question 7

B) Which map would likely be readable *only* if ArcView's Spatial Analyst extension were activated? Why?

8. You are querying three layers in a GIS.

A) What query statement is illustrated by the Venn Diagram?



B) Draw a Venn Diagram for the following condition:
A XOR (B or C)

9. Monument Valley (AZ-UT) possesses an interesting topography. The valley floor is fairly flat, but there is a great deal of localized relief in the form of vertically-standing monuments.



Question 9: Oblique aerial photo of Monument Valley

A) What are the limitations of a grid data format for capturing this terrain?

B) What alternative format may provide a better model for this landscape? Why?

10. Discuss the differences between the IDW and Spline methods for grid interpolation. Which would be used more effectively to model terrain surfaces?

11. Here is a grid of elevation values, in meters.

A) What is the mean, the median, and the mode of these attribute data?

(Show your work!)

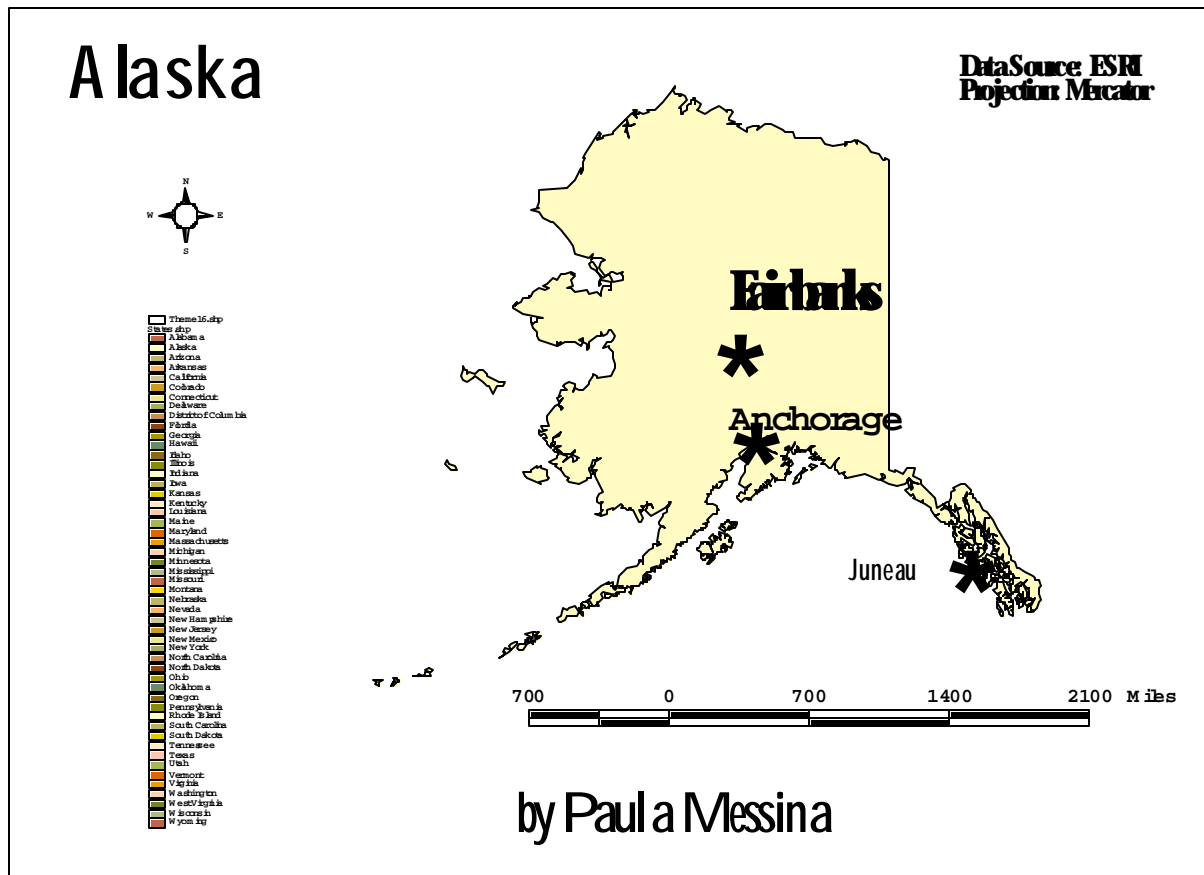
Mean = _____

Median = _____

Mode = _____

100	100	120
105	110	135
115	140	150

B) What is the attribute value for the *spatial* mean center of this array?



12. Label or list at least three problems with this map, and state possible solutions to these design flaws.

Directions (Part II): Pick only one question from this section. [40]

13. Calculate the slope and aspect for this kernal's central pixel. Each grid cell is 100 meters X 100 meters. *Show all work!*

$$\text{Slope} = \text{ArcTan} \sqrt{\left(\frac{dz}{dx}\right)^2 + \left(\frac{dz}{dy}\right)^2}$$

$$\text{Aspect} = \text{ArcTan} \left(\frac{-\left(\frac{dz}{dy}\right)}{\frac{dz}{dx}} \right)$$

180	200	220
170	190	200
160	180	200

If $\frac{dz}{dx}$ is a positive number, and $\frac{dz}{dy}$ is a positive number, subtract the calculated aspect from 270°

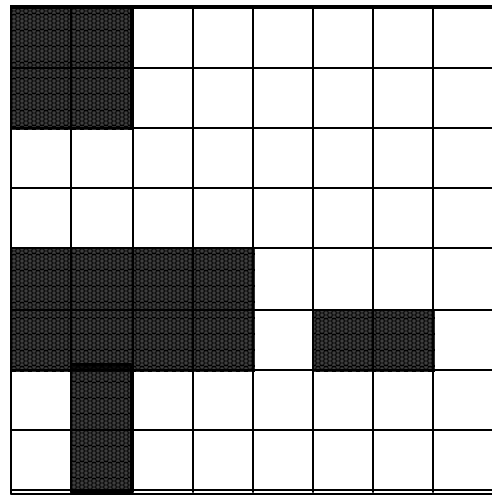
If $\frac{dz}{dx}$ is a positive number, but $\frac{dz}{dy}$ is a negative number, add the calculated aspect to 270E

If $\frac{dz}{dx}$ is a negative number, but $\frac{dz}{dy}$ is a positive number, subtract the calculated aspect from 90E

If $\frac{dz}{dx}$ is a negative number, and $\frac{dz}{dy}$ is a negative number, add the calculated aspect to 90E

14. To the right is a raster graphic of black and white pixels.

A) Write the Morton Code for this graphic using the Quad-tree structure.



B) What is the % savings of using a Morton compression technique, considering that the uncompressed file would be 64 Bytes?