

**Directions (Part I):** Answer any 10 of the following 13 questions. If you need more space, use the back of the paper. Each question in Part I is worth 6 points. [60]

1. Label the cartographic elements of the following map. (Filling in each of the six lines labeled A - F correctly will yield 6 points (1 point for item).

A. \_\_\_\_\_

B. \_\_\_\_\_

C. \_\_\_\_\_

D. \_\_\_\_\_

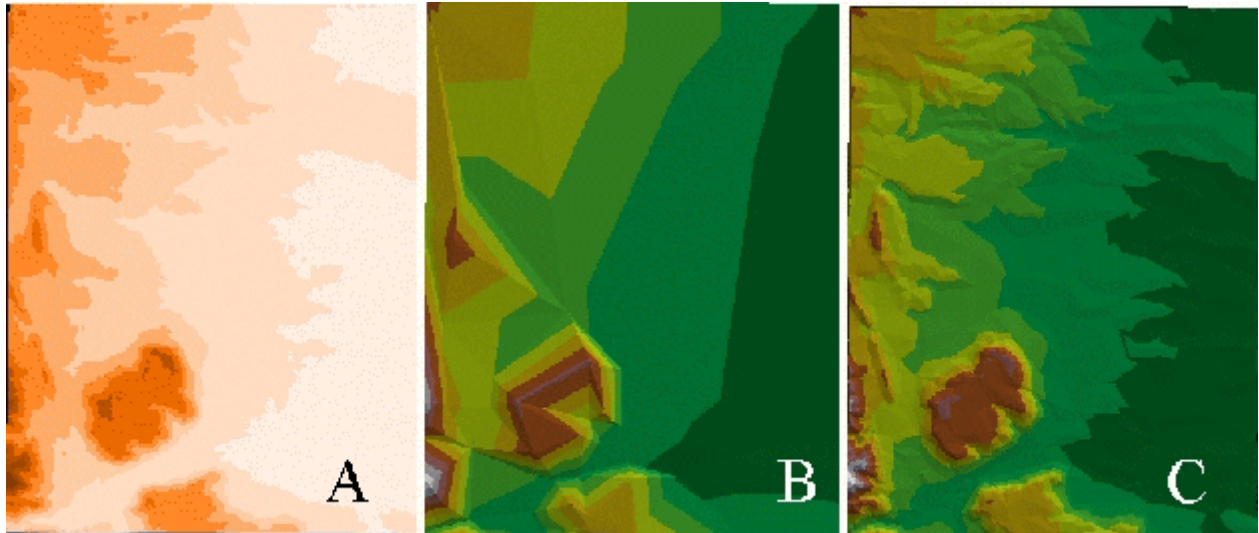
E. \_\_\_\_\_

F. \_\_\_\_\_

2. Explain three reasons why GISs are replacing paper maps [6].

3. It is over 2000 years since Eratosthenes inferred the shape and size of the Earth. Why is the shape of the Earth still in controversy [3], and what implications does this have to digital mapping [3]?

4. Below are three representations of digital terrain data of the 7.5' Golden Colorado Quad.



A. How is A different from B? [3]

B. How is B different from C? [3]

5. Describe the file formats (e.g., raster or vector?), data type (e.g., what does it *show*?), ArcView extensions required, and uses of:

- DEMs [2]
- DRGs [2]
- DOQs [2]

6. Describe how triangulation is the fundamental technique used for obtaining GPS fixes. (You may include a drawing to illustrate your point.) [6]

7. Discuss the responsibilities/functions of the Control Segment [2], the Space Segment [2], and the User Segment [2] of the GPS System.

8. What are the differences between 2D, 3D, and overdetermined 3D mode? [2] When would you choose 2D mode for mapping? [2] in what circumstances would you select overdetermined 3D mode? [2]

9. A GPS Mapper encounters a situation in which he is receiving data from four satellites, yet his PDOP is 10! His PDOP mask is set as 6, so his data logger has stopped logging positions. What could be wrong? [3] What should he do? [3]

10. Although Selective Availability was switched off on May 1, why is differential correction still being utilized? [1] List three possible types of error in collecting GPS data, and their relative magnitudes. [2] Give one example of each of the three types of error. [3]

11. According to an online mapping web page, the distance from San José to Lee Vining is 225.723 miles when Tioga Pass is open. This same web page estimates the travel time as 6 hours 53 minutes and 47 seconds. Are these measurements accurate, precise, both accurate *and* precise, or *neither* accurate *nor* precise? [2] What is accuracy? [2] What is precision? [2]

12. What is orthorectification? [2] What is georegistration? [2] Why didn't we need to warp the DRGs we used in our final project? [2]

13. Write your own question, and then answer it. [6]

**Directions** (Part II): Select only one of the following two questions. Your responses should be well-organized, well-formulated, and comprehensive in depth. Where necessary, describe a possible data dictionary to use, data sets to be imported, extensions to be used within ArcView, etc.[40]

13. A report in the *San José Mercury News* (August 3, 1999) focused on the shrinking habitat of the bay checkerspot butterfly within Santa Clara County. The butterfly's main food sources are the following plants: dwarf plantain, purple owl's clover, desert parsley, and California goldfields. Surprisingly, these species grow on (otherwise inhospitable, magnesium-rich) serpentine-derived soils. Both the butterfly and its food sources prefer to live in the cooler, higher elevations of the East Bay and Santa Teresa Hills, and the Santa Cruz Mountains, however, a range of temperature zones is important due to seasonal vegetation limits.

Your job is to produce a map of possible bay checkerspot butterfly habitat. Your tools are: a real-time DGPS receiver (with lots of batteries!), a computer (with ArcView, Trimble Pathfinder, and Internet access). What will you do

- to prepare for your mapping project? [15]
- while in the field? [15]
- after field work? [10]

14. Below is an oblique view of the Racetrack Playa, as mapped by your professor.

The image depicts the Racetrack Playa in Death Valley National Park. The black lines at the south end of the dry lake bed represent the trails of the Racetrack's "sliding rocks."

Her only tools were: a Trimble GPS receiver, a laptop computer (with ArcView, Trimble Pathfinder, and Internet access), and a good pair of hiking boots. Describe how this image was generated by inferring:

- what was done prior to and during field mapping of the sliding rock trails? [15]
- what was done after the field mapping was complete? [10]
- how was this image produced within a GIS environment? [15]

