ES492/592 GIS Applications
In-Class Exercise: Introduction to Contouring and Digital Elevation Models

Examine the attached map figures. Fig. 8.10 shows a visual 3-D model of the Earth's surface and the depiction of corresponding topographic contour lines that connect points of equal elevation.

Task 1. Using the spot elevation data depicted in Fig. 8.11 A and B, contour each map using a contour interval of 10 feet. Map A will include lines 480, 490, 500, 510, 520. Map B will include lines 90, 100, 110, 120, 130, 140.

Task 2. Using the bar scale and a ruler, calculate the fractional scale of the maps in Fig. 8.11.

$1.651 cm = 10 m$ $10 m \left(\frac{100 cm}{m}\right) = 1000 cm$ $\frac{1.651 cm = 1000 cm}{1.651 cm}$ $\frac{}{1.651 cm}$ = $1 cm = 605.7 cm$ = $\boxed{1:605.7}$

Task 3. Create a rasterized digital elevation model for your contour map. Easting (X position in meters) and Northing (Y position in meters) coordinates for the corners of Map A are as follows:

NW corner coordinates = 1,463,243 m, 538,275 m
SE corner coordinates = 1,463,293 m, 538,243 m

    3A. Calculate the total East-West distance covered by map A in meters = __50 m__
    3B. Calculate the total North-South distance covered by map A in meters = __32 m__

    3C. Our goal is to create a raster grid to overlay map A with a cell resolution of 2 meters. Given the map boundaries and dimensions listed above, determine the number of grid rows and columns that will be required to divide the map into 2 m grid cells.

        N-S   No. Rows = __16__

        E-W   No. Columns = __25__

    3D. Measure the map dimensions in inches: E-W Distance = __3.23__ inches N-S dist = __2.05__ inches
                                                     E-W   N-S

    3E. Calculate the map-scale dimensions of each 2-m grid cell in inches = __.13__ X __.13__ (in)

    3 F. Starting at the North edge, and East edge of map A, draw a series of rows and columns to scale, that depict a 2-m grid overlay on the map.

    3G. Now for each cell on the map, interpolate an elevation and classify the grid cell according to the following scale (use color pencils to carefully color each cell. STAY IN THE LINES):

        480-490 ft elev. = Blue
        490-500 ft elev. = Green
        500-510 ft elev. = Yellow
        510-520 ft elev. = Red

Task 4: You did it! You have now overlain a rasterized 2-m Digital Elevation Model on top of a vectorized contour map. Provide a brief discussion of the differences between vector and raster data models.

The vector map provides specific features of the landscape (like elevation through contour lines). The raster data model applies a specific geographic location & allows for further landscape classification using GPS coordinates (UTM in this example).
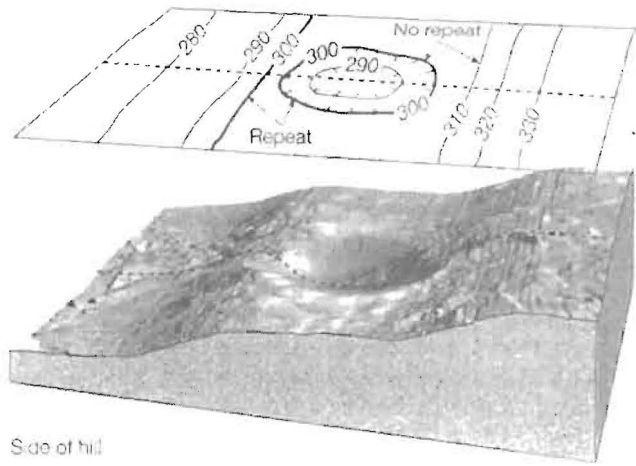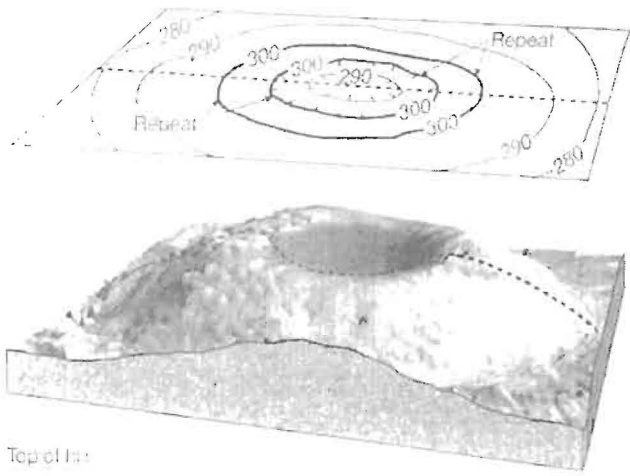
FIGURE 8.10 Contour lines repeat on opposite sides of a depression (left illustration), except when the depression occurs on a slope (right illustration).
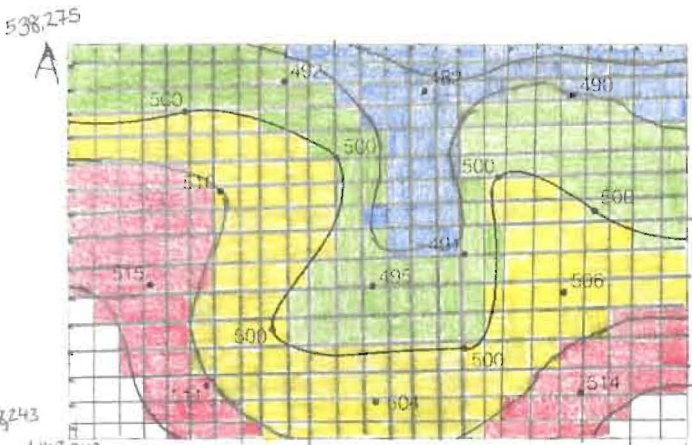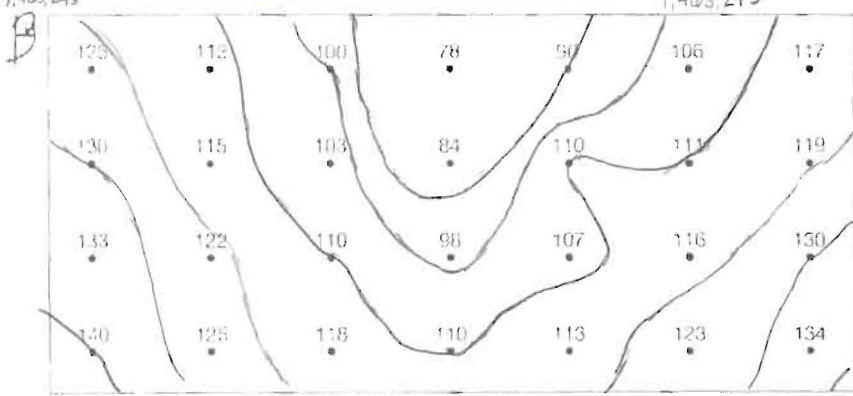

FIGURE 8.11 Topographic map construction (elevations are in feet). Notice in map **A** that a 500-foot contour line has been drawn through all the points that have an elevation of 500 feet above mean sea level. Can you finish contouring both maps using a contour interval of 10 feet?

0.65"
1.651 cm