ES302 Quantitative Methods
Introduction to Contouring Exercise – The Inverse Distance Interpolation Method

Drawing contour lines involves connecting map points of equal values, depending the type of attribute information (e.g. elevation, rainfall, groundwater elevation, population density, etc.). Map data are commonly provided as discrete points with known X and Y coordinates (eastings, northings), and some type of z-value (e.g. elevation) that represents continuously changing values across the Earth's surface.

Contouring provides a method for converting "spot" information into continuous surfaces represented with contour lines. The contour interval is the z-value difference between each line. Spot elevation data are represented by x,y,z values that are used to interpolate contour lines between points.

Project objective: to use the inverse-distance interpolation method to carefully draw a set of contour lines for 4 surveyed elevation points.

Consider an example in which four locations are surveyed for their coordinates in a relative easting-northing system measured in feet. Refer to the attached location map. The position-bearing-location information for points A,B,C,D are presented in Table 1.

Task 1: on a separate sheet of graph paper, carefully plot out the positions of A,B,C,D to scale, using 1 in = 1000 ft. Use a protractor and engineer's scale to carefully plot their positions. Note: the attached sketch map is not to scale.

Task 2: determine the azimuth bearing from Pt. D to Pt. A, and the distance between each (ft). Fill in the blank spaces on Table 1 to complete the data compilation.

The only position information available is for Pt. A,, with location coordinates of 21375 ft E., and 10434 ft N.

Task 3: from the information provided, and using your scaled map drawing, determine the x, y, and z values for points B, C, D. Complete Table 2, fill in the blanks.

Your goal is to use the spot elevation data for the four points and carefully to scale, construct a set of elevation contour lines using the inverse-distance method of interpolation (refer to instructor lecture notes for details of the methodology).

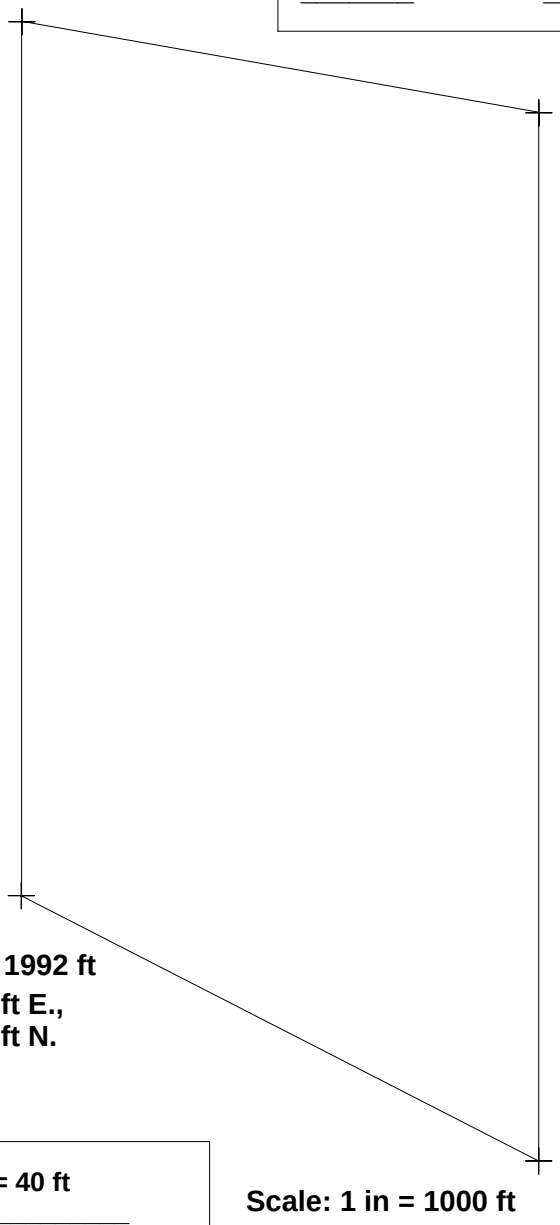
Task 4: complete Table 3. Fill in the maximum point elevation, the minimum, the relief, then using a contour interval of 40 ft, determine the even-increment multiples of the six contour lines that bracket the elevation differences represented by the point data.

Task 5: using careful measurement and distance measurement on your scaled map, interpolate all combinations of contour line elevations possible, draw contour lines connecting points of equal elevation as listed in Table 3 and using a contour interval of 40 ft. NOTE: scale and proportion your interpolated distances and projected elevations assuming constant slope gradients between the control points. ***Label all your lines and show all your math work during the interpolation process.***

ES302 Exercise - Contouring
Inverse-Distance Interpolation Method

Table 2.

Easting (ft)	Northing (ft)	Elev. (ft)	Pt. ID
21375	10434	1992	A
_____	_____	_____	B
_____	_____	_____	C
_____	_____	_____	D



Scale: 1 in = 1000 ft

Table 3.

Contour Interval = 40 ft
Max. Elev. (ft) = _____
Min. Elev. (ft) = _____

Six Contour Lines That Bracket Maximum Vertical Relief

_____ _____
_____ _____
_____ _____

Table 1.

From Pt	To Pt	Azimuth	Distance (ft)
A	B	0	5000
B	C	100	3000
C	D	180	6000
D	A	_____	_____

ES302 Contouring Exercise

Using the spot elevations (ft AMSL) on the base map below, contour the map using the inverse distance scaling method, Assuming constant slope gradient between the point stations. Use a contour interval of 5 ft.

Use an engineers scale or 10 x 10 transparency overlay to very carefully establish inverse distance ratios, and interpolate distances between points to mark you contour line positions.