November 7, 2006

GEO 327G/386G Exam 2 – Review Questions

True or False: Please circle "T" or "F" after each statement as appropriate.

[1] ____Nominal raster cell data are values that record the strength, intensity, magnitude etc. at the location of the cell.

[2] ____DEMs are an example of raster data.

[3] ____ SA, selective availability, is an intentional degradation of GPS signals that limits the accuracy of positions determined by a single receiver.

[4] ____A raster cell ordinal value is an integer that records the rank of an attribute at the location of the cell.

[5] ____A raster data format would be the best way to store information about well locations.

[6] ____A raster with higher dimensions (more cells) necessarily has greater resolution than a raster of lower dimensions.

[7] ____Reclassification changes the resolution of a raster.

[8] ____Raster cell values are always integers.

[9] ____A binary raster can store two attributes per cell.

Fill in the blank: Please print the correct answer on the appropriate line.

[10] The "D" in DGPS stands for _____

[11] The "V" in VAT stands for _____

[12] The "E" in DEM stands for _____

Multiple choice: Please circle the letter of the single best answer.

[13] The resolution of raster data is given by the

(a) number of cells.
(b) cell size.
(c) form of data compression.
(d) number of nodes or arcs present.
(e) type of file format.

[14] You have variably spaced point data for a study area. You create a grid over the entire study area from this point data using the IDW technique. By using IDW, you have assumed that

(a) the point data don't vary spatially.
(b) interpolation is not a valid method of creating a grid
(c) point data values increase and/or decrease as a function of distances between points
(d) the data define a gently varying surface.
(e) all data points are of equal weight, regardless of their spacing with respect to cell centers

[15] The spline technique of interpolation fits a surface

(a) of minimum curvature through observation points
(b) of minimum variance to observation points, but not necessarily through them
(c) that is explicitly weighted by inverse distance
(d) that does not pass through the data points
(e) that is a vector polynomial

16) GPS is all about

a) the frequency shift of a radio wave(s)
b) receivers which broadcast radio signals
c) accurate measurement of radio wave frequencies
d) null data strings
e) timekeeping

17) Which of the following is <u>not</u> a significant source of error in GPS determinations?

a) ionospheric refraction
b) clock errors
c) multipathing
d) ephemeris errors
e) clouds

18) The accuracy of standard, single receiver, GPS positions (e.g. like that obtained from a Garmin E-trex without WAAS) today are on the order of

a. 15 meters
b. 100 meters
c. 50 meters
d. 1 meter
e. less than a meter

19) Differential GPS is different from standard GPS in requiring

a. data from two receivers instead of one
b. a receiver at a known location
c. a more accurate clock in the receiver
d. a & b
e. all of the above

20) _____ satellites are required for accurately determining _____.
   a. three; latitude, longitude, elevation and a clock correction
   b. five; latitude, longitude, elevation and satellite orbits
   c. four; latitude, longitude, elevation and clock correction
   d. four; latitude, longitude, satellite orbits and clock correction
   e. three; latitude, longitude and elevation

21) A GPS code solution for a position relies upon
   a. the wavelength of the radio wave broadcast by satellites
   b. corrections broadcast from a beacon
   c. the offset of the codes generated by the receiver and the satellites
   d. a differential correction
   e. two different codes, L1 & L2

22) A GPS carrier-phase solution for a position relies upon
   a. knowing the number of waves that have passed between a satellite and a receiver
   b. accurately deciphering the code
   c. the amplitude of the radio waves
   d. accurately subtracting multipath errors
   e. the absence of selective availability

23) GPS radio waves carry messages that are referred to as
   a) the C/A code
   b) the P code
   c) the Y code
   d) an almanac
   e) all of the above

24) The general technique of one-way ranging requires
   a) a laser
   b) synchronized clocks at the transmitter and receiver
   c) a known distance between the transmitter and receiver
   d) one very accurate clock
   e) all of the above

25) The basis for determining a position by GPS is knowing
   a. the time it takes for signals to travel from satellites to a receiver
   b. the distance to one of four satellites
   c. how the frequency of radio waves changes as a function of distance
   d. the amount of offset between frequency transmitted by different satellites
   e. all of the above

[26] WAAS is

(a) an averaging technique for post-processing GPS measurements
(b) a tool for obtaining real-time differential GPS, courtesy of the Federal Aviation Administration
(c) a restricted military system for acquiring higher accuracy in GPS measurements
(d) a measure of GPS receiver accuracy
(e) an acronym for "width of amplitude at symmetric-DOP"

[27] PDOP or GDOP are

(a) measures of satellite geometry at the time GPS data are acquired
(b) factors in the overall precision of a GPS measurement
(c) values that are best when low; a PDOP of 4 is better than one of 6.
(d) a and b
(e) all of the above

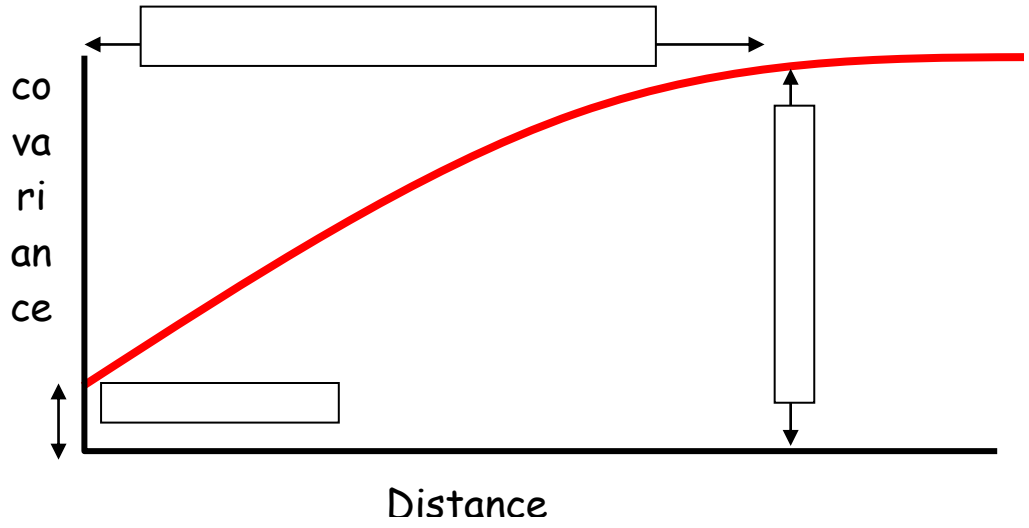
[28] To determine orthometric height from a GPS reading requires

(a) a topographic map
(b) data from three satellites
(c) knowledge of the difference between the height of the geoid and ellipsoid
(d) a beacon signal that can be used for differential correction
(e) all of the above

[29] The primary difference in a geodetic-quality receiver and a small, inexpensive, hand-held unit, like the Garmin E-trex, is the

(a) ability of the former to store raw satellite data for later post-processing
(b) better reception of the geodetic unit
(c) higher inherent signal to noise ratios of the latter
(d) more portable nature of the former
(e) all of the above

[30] Fill in the boxes with the names of the features shown with the double headed arrows in the diagram below. The vertical axis is covariance, the horizontal is distance.



[31] A buffer raster contains cells that
(a) have nominal values
(b) store the distance from a feature
(c) are the result of an overlay operation
(d) record the magnitude of part of the electromagnetic spectrum
(e) store geographic locations

[32] "Map Algebra" refers to
(a) a form of spatial analysis specific to raster data
(b) interpolation of randomly spaced point data to produce a raster
(c) the application of statistical techniques to spatial data
(d) vector addition and subtraction
(e) matrix manipulation of weighted cell values

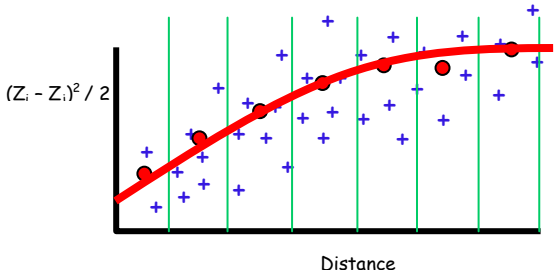
[33] The process of reclassification can be used for
(a) converting vector to raster data
(b) calculating zonal statistics
(c) converting categorical raster values to ratio values
(d) calculating neighborhood statistics
(e) making shapefiles

[34] Raster data are better than vector data for representing
(a) objects with well defined boundaries.
(b) data that will be queried for topological dependencies.
(c) spatially continuous data.
(d) data with a high degree of geographic accuracy.
(e) all of the above

[35] A raster suitability analysis addresses questions about
(a) finding all records that have a particular attribute
(b) the least cost path between two points
(c) what is the length from point A to point B?
(d) optimum locations or most likely place to find something
(e) all of the above

[36] In overlay analysis, grid resampling is done to ensure
(a) grid cells in all layers are the same size
(b) grid cell values are normalized to a common scale
(c) all grids cover exactly the same area
(d) categorical values are the same for all grids
(e) no two grids are identical

[37] The graphic below shows



(a) the result of spline surface analysis
(b) a semivariogram.
(c) a step in trend surface analyis.
(d) the result of a spline calculation
(e) the form of a trend surface

[38] Binary rasters are
(a) composed of ones and zeros
(b) composed of floating point values
(c) produced by accumulative map algebra operations
(d) a form of an extended raster
(e) generated by global raster functions

[39] Inverse distance weighting is a technique for
(a) merging two grids.
(b) finding the difference between two grids.
(c) spatial interpolation of point data.
(d) calculating hillshades.
(e) overlaying two vector maps.

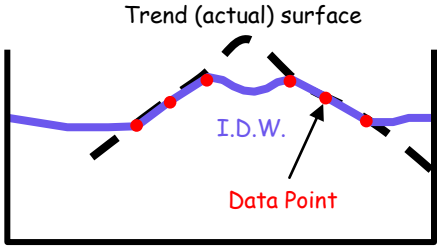
[40] Kriging is a(n)
(a) spatial interpolation technique
(b) form of inverse distance weighting
(c) method that requires lots of user input
(d) way of predicting z-values where no data exist
(e) all of the above

[41] Map overlay analysis addresses questions about
(a) spatial relationship within a raster layer
(b) containment
(c) intersection
(d) adjacency
(e) spatial relationships among raster layer

[42] Map algebra operators are useful for
(a) comparing two rasters
(b) combining two rasters
(c) filtering rasters
(d) reclassifying rasters
(e) all of the above

[43] A spatial interpolation technique that relies on fitting a polynomial to data points is called
(a) trend surface analysis
(b) kriging
(c) inverse distance weighting
(d) map algebra
(e) cokriging

[44] The graphic below illustrates



(a) one of the shortcoming of inverse distance weighting
(b) the reasons IDW is preferred for modeling topographic
(c) the results of a least squares regression
(d) common problems with assuming a Gaussian curve fit
(e) the method used in splining a surface

[45] A semivariogram is used to
(a) look for patterns in z values over distances
(b) find the best fit polynomial for a spline surface
(c) find an exact solution for inverse distance weighting
(d) construct a model of the slope of a surface
(e) all of the above

[46] You import well data into ArcGIS. Each well has a well number. You create a grid on the well number.
(a) This grid will allow you to predict well numbers in places where there are no wells.
(b) This grid is meaningless because well number is not a continuous variable.
(c) This grid can be used with Map Calculator to do something useful.
(d) This grid can be used with Map Query to do something useful.
(e) ArcGIS will not let you create such a grid.

[47] “Reclassifying” a raster is done by
(a) projecting the raster to a different coordinate system or datum
(b) resampling a grid to higher resolution
(c) interpolation.
(d) replacing old cell values with new cell values
(e) all of the above.

Answer True (T) or False (F)

[48] ___ Raster cells can carry only one attribute value.

[49] ___ Kriging doesn’t work for data that define simple, smooth surfaces.

[50] ___ One problem with IDW is that it doesn’t permit z values that are greater than or less than those that already exist.

[51] ___ In Raster Filtering, a focal function, a target cell value is replaced by a value calculated from neighboring cells.

[52] ___ The nugget in a variogram describes the range of values that exist in a dataset.

[53] ___ Kriging, Spline and Trend are different types of interpolation techniques that can yield uniform grids of values from unevenly spaced point data.

[54] ___ The range in a variogram is the distance between points at which there is no autocorrelation

[55] ___ Tobler’s law states that things that are further apart are more closely related than things that are closer together.

[56] ___ One of the strengths of Kriging is the ability to look for trends in data before attempting to model them.