Intermediate Geographic Information Systems (GIS) 1 Practice Exam (Sample)

Study Guide

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Questions

1. Why is surface interpolation significant in spatial analysis?

A. It is used to visualize data trends

B. It enables understanding of geographical features

C. It estimates unknown values from surrounding known points

D. It assists in creating layer stacks

2. A map showing car race winners by their ranking is an example of which kind of data?

A. Ordinal

B. Nominal

C. Interval

D. Ratio

3. Which of the following options is not available as a basemap in ArcGIS Online?

A. Bing Maps

B. OpenStreetMap

C. Google Maps

D. Topographic Map

4. What does geocoding refer to?

A. The process of creating maps from raw data

B. The method of converting satellite images into 3D models

C. The process of converting addresses into geographic coordinates

D. A technique used to categorize geographic data

5. Which of the following options represents the largest-scale map?

A. 1:100

B. 1:1000

C. 1:10,000

D. 1:1

6. What datum is primarily used by the Global Positioning System (GPS)?

A. WGS84

B. NAD83

C. ED50

D. OSGB36

7. Which feature helps in determining distance on a map?

A. North Arrow

B. Scale Bar

C. Legend

D. Grid Patterns

8. Which international metadata standards have been adopted in North America?

A. ISO 9001

B. ISO 191xx

C. ISO 30300

D. ISO 26000

9. Which term describes a view of the world where features have definite locations and boundaries?

A. Continuous View

B. Discrete View

C. Dynamic View

D. Objective View

10. What is the primary purpose of surface interpolation in GIS?

A. To create new map layers

B. To estimate values at unknown locations based on known values

C. To analyze network efficiencies

D. To provide a graphical representation of data

Answers

1. C
2. A
3. C
4. C
5. D
6. A
7. B
8. B
9. B
10. B

Explanations

1. Why is surface interpolation significant in spatial analysis?

A. It is used to visualize data trends

B. It enables understanding of geographical features

C. It estimates unknown values from surrounding known points

D. It assists in creating layer stacks

Surface interpolation is significant in spatial analysis primarily because it estimates unknown values based on surrounding known points. This technique is essential for creating continuous surfaces from discrete sets of data, which are common in various fields such as environmental science, geology, and meteorology. By utilizing interpolation methods, analysts can fill in gaps where data may not have been collected, allowing for a more comprehensive understanding of spatial phenomena. The process involves applying algorithms that use the values of known points to predict and generate values for unknown locations within the area of interest. Various interpolation techniques, such as kriging, spline, or inverse distance weighting, can be employed depending on the nature of the data and the required accuracy. Visualizing data trends and understanding geographical features are essential outcomes of interpolation, but those aspects rely on the underlying ability to generate those interpolated surfaces. Similarly, while creating layer stacks is a part of spatial analysis, it is often a result of understanding and manipulating surfaces that have been generated through interpolation methods. Thus, the core significance of surface interpolation lies in its capability to estimate values and provide a complete view of the spatial relationships inherent in the data.

2. A map showing car race winners by their ranking is an example of which kind of data?

A. Ordinal

B. Nominal

C. Interval

D. Ratio

The scenario presented describes a map that displays car race winners categorized by their ranking, which inherently involves a specific order to the data points. In this context, the rankings represent an ordinal data type. Ordinal data is characterized by the presence of a meaningful order or hierarchy among the values, but the intervals between these values are not necessarily consistent or meaningful. For example, the difference between first and second place may not indicate the same performance gap as between second and third place. Hence, while rankings allow you to understand who placed better in a given race, they do not provide precise measurements of performance. This classification distinguishes ranking data from nominal, interval, or ratio data. Nominal data involves categories without a defined order (like colors or types of cars), interval data includes ordered values with meaningful intervals but no true zero (like temperature in Celsius), and ratio data has all the characteristics of interval data with an absolute zero point, allowing for the comparison of absolute values (like lap times measured in seconds). In your example, the ranking system fits the definition of ordinal data as it conveys position but not the exact margin of victory or relationship in performance between the ranks.

3. Which of the following options is not available as a basemap in ArcGIS Online?

A. Bing Maps

B. OpenStreetMap

C. Google Maps

D. Topographic Map

In ArcGIS Online, Google Maps is not available as a basemap due to licensing and proprietary restrictions. Google Maps has its own terms of service that do not allow for its use as a map layer in other mapping services without specific agreements. This is in contrast to the other options listed, such as Bing Maps, OpenStreetMap, and Topographic Map, which are accessible and can be integrated into ArcGIS Online as basemaps without any licensing issues. Bing Maps is a Microsoft service that's compatible, OpenStreetMap is an open-access map provided by a community of mappers, and Topographic Maps are often used within GIS for their detailed terrain information.

4. What does geocoding refer to?

A. The process of creating maps from raw data

B. The method of converting satellite images into 3D models

C. The process of converting addresses into geographic coordinates

D. A technique used to categorize geographic data

Geocoding specifically refers to the process of converting addresses, such as street addresses, into geographic coordinates (latitude and longitude). This conversion is essential in many GIS applications, as it allows for the mapping and analysis of locations based on address data. By transforming these textual descriptors into numerical values, geocoding enables users to create accurate geographic representations of points on a map, facilitating spatial analysis and various location-based services. While creating maps from raw data is an important aspect of GIS, this process encompasses more than just geocoding and includes data visualization and analysis techniques. Similarly, the method of converting satellite images into 3D models pertains to photogrammetry and remote sensing, which are different disciplines within GIS. Categorizing geographic data involves organizing data based on attributes without necessarily converting it into geographic coordinates. Hence, these alternative definitions do not accurately capture the essence of geocoding.

5. Which of the following options represents the largest-scale map?

A. 1:100

B. 1:1000

C. 1:10,000

D. 1:1

The answer provided is indeed the largest-scale map among the options listed. In cartography, scale refers to the relationship between distance on the map and the corresponding distance on the ground. A scale of 1:1 means that one unit of measurement on the map corresponds to one unit of measurement in reality, making it the most detailed scale possible. This large scale allows for a high level of detail and is used for situations where precision is critical, such as architectural plans or specific site surveys. As the scale denominator increases in value (like in options such as 1:100, 1:1000, and 1:10,000), the level of detail decreases because more ground area is represented by the same amount of map space. Thus, larger-denominator scales are considered smaller scales in cartographic terms. In simple terms, the larger the first number in the scale (which is always 1), the closer to reality the map represents physical features, making 1:1 the largest scale possible.

6. What datum is primarily used by the Global Positioning System (GPS)?

A. WGS84

B. NAD83

C. ED50

D. OSGB36

The Global Positioning System (GPS) primarily utilizes the WGS84 datum, which stands for World Geodetic System 1984. WGS84 serves as a global standard for spatial reference, making it exceptionally suited for GPS applications that require worldwide accuracy. The development of WGS84 was specifically aimed at providing a unified frame of reference for global positioning and navigation. WGS84 includes a geodetic coordinate system that incorporates latitude, longitude, and altitude, enabling it to accurately represent positions anywhere on Earth's surface. This system also accounts for variations in Earth's shape and gravitational field, leading to improved precision in GPS measurements. Moreover, since GPS is designed to operate globally, using a universal datum like WGS84 facilitates seamless data integration and communication across different geographic regions and systems. Other datums, such as NAD83 (North American Datum 1983), ED50 (European Datum 1950), and OSGB36 (Ordnance Survey Great Britain 1936) are more region-specific and do not provide the same global reference framework as WGS84. While these datums can be used for specific applications or certain regions, WGS84's global reach and compatibility make it the primary choice for GPS technology.

7. Which feature helps in determining distance on a map?

A. North Arrow

B. Scale Bar

C. Legend

D. Grid Patterns

The scale bar is crucial for determining distance on a map as it provides a visual representation of distance measurements. It typically indicates a specific distance on the ground equivalent to a certain length on the map. By using the scale bar, users can accurately estimate real-world distances between points, helping them understand the spatial relationships present in the map. Depending on the type of map and its scale, the scale bar can also indicate different units of distance, such as kilometers or miles, allowing for versatile applications in various contexts such as navigation, planning, or land use analysis. In contrast, while other features like the north arrow help with orientation, legends provide explanations of symbols used on the map, and grid patterns offer a way to identify locations, none of these directly assist in measuring distance as effectively as the scale bar does. Each serves a distinct purpose, but the scale bar remains essential for evaluating distances accurately.

8. Which international metadata standards have been adopted in North America?

A. ISO 9001

B. ISO 191xx

C. ISO 30300

D. ISO 26000

The selection of ISO 191xx as the correct answer is based on its specific focus on geographic information and related services. This standard series encompasses a variety of elements including data quality, geographic information datasets, services, and metadata. The adoption of ISO 191xx in North America is significant because it provides a structured framework for documenting, managing, and sharing geographic data through standardized metadata practices. ISO 191xx is essential in ensuring interoperability and compatibility among various spatial data systems, facilitating data sharing and reuse, which is crucial in fields such as environmental management, urban planning, and natural resource management. This series is widely acknowledged and utilized in GIS applications across North America, aligning practices with international standards that promote data consistency and reliability. In contrast, the other mentioned standards serve different purposes. ISO 9001 focuses on quality management systems across various industries, ISO 30300 pertains to information and documentation management, and ISO 26000 provides guidance on social responsibility. These do not directly address the unique needs and challenges associated with geographic information and its metadata, which is why they are not the most relevant choices in this context.

9. Which term describes a view of the world where features have definite locations and boundaries?

A. Continuous View

B. Discrete View

C. Dynamic View

D. Objective View

The term that accurately describes a view of the world where features possess definite locations and boundaries is the discrete view. This perspective is crucial in GIS as it focuses on distinct, separate entities or features, which can be clearly identified and mapped. For example, discrete features might include individual buildings, parcels of land, or roads. Each of these features can be defined by specific boundaries and attributes, making them precisely locatable on a map. This contrasts with the continuous view, which represents phenomena that vary smoothly over space, such as temperature or elevation, where there are no distinct boundaries but rather a gradient or field. Understanding the discrete view is fundamental in GIS because it allows for effective spatial analysis and manipulation of data, which is critical when working with vector data types. This perspective aids in answering questions related to zoning, land use, and resource management, where clear boundaries are necessary for decision-making.

10. What is the primary purpose of surface interpolation in GIS?

A. To create new map layers

B. To estimate values at unknown locations based on known values

C. To analyze network efficiencies

D. To provide a graphical representation of data

The primary purpose of surface interpolation in GIS is to estimate values at unknown locations based on known values, which is precisely what the selected answer reflects. This technique involves using a set of data points with known values (e.g., elevation, temperature, or pollution levels) to create a continuous surface that predicts values at locations where no measurements exist. Through various interpolation methods—such as inverse distance weighting, kriging, or spline—GIS can generate a smooth and coherent representation of spatial phenomena. This is particularly valuable in fields like meteorology, environmental science, and urban planning, where understanding gradients or changes across a landscape is crucial. In practice, surface interpolation allows GIS professionals to analyze trends, identify patterns, and make decisions based on derived data rather than just discrete measurements. While options like creating new map layers, analyzing network efficiencies, or providing graphical representations of data involve aspects of GIS, these are not the fundamental aim of surface interpolation. Rather, they support different functionalities within the GIS ecosystem, illustrating the breadth of tools and methodologies used in geographic analysis.