Review sheet for midterm exam

The exam will cover materials from the lectures and assigned readings from the textbook. The exam will consist of multiple choice and short answer questions. The following topics are likely to be included on the exam, but the list is not all-inclusive so please thoroughly review your lecture notes and assigned readings.

**Basics of geographic representation**
Definitions of GIS and GIScience
Types and examples of spatial data
Vector data structures
Raster data structures
Spatial thinking and why it is important
Scale
Topology
Converting between data structures

**Cartography**
Purpose and function of maps
Reference maps
Thematic maps
Data measurement levels
Elements of map design
Mapping point data
Mapping line data
Mapping area/polygon data
Choropleth color schemes
Interpreting map scales (representative fractions & scale bars)

**Data management & data quality**
Decimal vs. binary numbers
Data types (integer, floating point, text, etc.)
Database management systems
Flat file data model and terminology
Relational database model and terminology
Database relationships
Relating and joining data
Attribute queries
Spatial queries
Boolean operators
Metadata
Data accuracy and precision
Sources and types of error
Assessing error
Creating an error matrix to measure classification accuracy
Root mean square error

**Geospatial technologies**
In-situ data collection
Global Navigation Satellite Systems (GNSS)
  How GPS works
  Components of GPS
  Sources of GPS error
  Technologies to improve accuracy
  GPS applications

Remote sensing
  Active vs. passive sensing
  Spectral signatures
  Spatial resolution
  Spectral resolution
  Temporal Resolution
  Orthophotography

**Map projections & coordinate systems**
Great circles and small circles
Characteristics of meridians and parallels
How to determine latitude and longitude without a GPS
The graticule
Models of the earth’s shape: spheroids, ellipsoids, geoids
Geodetic surveys
Horizontal and vertical datum
Selecting an appropriate map projection
Types of developable surfaces
Standard points/lines
Cylindrical projections
  Mercator
  Transverse Mercator
  Mollweide
  Equirectangular
  Gall-Peters
Azimuthal/planar projections
  Gnmonic
Orthographic
Conical projections
  Albers equal area
  Lambert conformal conic
Compromise projections
State plane coordinates
Universal Transverse Mercator coordinates

Spatial analysis of vector and raster data
Buffering
Overlay
Types of overlay operations
Raster buffering
Local raster operations
Map algebra
Neighborhood raster operations
Spatial frequency and filtering
Zonal statistics