**Geo 266. GIS Analysis | Winter Term 2016 | Midterm Exam**

**Due. Wednesday Feb 3 @ 12:59 pm (before class starts)**

**Instructions**

This exam consists of multiple parts that can be completed both in-class and outside of class. The entire exam is “open book”, meaning that you can use any resource provided so far (e.g. textbook, lecture notes, ESRI Help documentation) EXCEPT YOUR PEERS. This is an individual assignment and all answers must be adequately cited or put into your own words. Email your completed midterm to the instructor. Include all responses and outputs in a single PDF document.

**PART I**

Answer the following questions in full sentences and in 1-2 paragraphs.

*Census data mapping*

1. **What type of data can you find at the Census Bureau’s American Fact Finder? How can you use that data for mapping?**

*Data Management*

1. **Explain your techniques for managing GIS data. Why is it important to have a method in place for managing data?**

*Editing in GIS*

1. **What is Topology and how is it used for creating and editing data in ArcGIS? Be sure to explain how it is created, example rules, and a real-world example of when you would use it.**
2. **What is a feature template and why are they useful?**

*Geodatabases*

1. ***What are two advantages of using a Geodatabase?***
2. ***Pick one geodatabase component and explain what it is and provide an example of when you would use it for mapping/spatial analysis.***

*Spatial Models*

1. **Explain the difference between Boolean & Arithmetic logic.**

*Geoprocessing Environments*

1. **What environments should you set prior to performing spatial analysis?**

**PART II**

This section will focus on editing data sets, using a variety of the editing tools. It is up to you to decide what tool to use, and to use it correctly.

You have been hired by the Heron Lakes Golf Club to create a map of the golf course that includes the trails, golf course boundary, and water bodies.

In the midterm folder you will find:

* Aerial photo of the golf course and surrounding area
* HLGC\_Lakes: waterbodies in and around the golf course
* HLGC\_Taxlots: A collection of taxlots the cover the golf course

You will:

* Create a boundary of just the golf course using the taxlots data set provided. Edit the dataset so that:
	+ all the taxlots are combined into one polygon
	+ the boundary ONLY includes the golf course (not the Portland Raceway or anything else sitting right next to it). You can use Google maps or other resources as a reference to determine the golf course boundary
* Modify the Lakes dataset to delete all waterbodies outside of the golf course boundary
* Create a new line feature class, and digitize all the trails within the golf course
1. **When you are finished editing and creating new data, create a map, using cartographic principles, of Heron Lakes golf course, displaying all three datasets (golf course boundary, waterbodies, and trails).**

**PART III**

This section will focus on building a model using ArcGIS Model Builder. Below is a series of steps that you will convert into a workflow using model builder. You will build a model to analyze crime in Portland in 2014.

* Use the ‘Select’ tool with Crimes2014 as the input and write an SQL expression that selects the following crimes: Homicide, Aggravated Assault. Name the output, SeriousCrimes.
* Use the ‘Spatial Join’ tool to join the SeriousCrimes to pdx\_nbhds. Name the output, SeriousCrime\_nbhd.
* In the model Environments, set the processing extent to be the same as pdx\_nbhd.
* Use the ‘Kernel Density’ tool to create a heatmap of the crime. Set SeriousCrimes as the input; call the output CrimeDensity; set the output cell size to 30; set the search radius to 15,000; the Area units should be Square feet. Keep all other parameters as the default.
* Use the ‘Extract by Mask’ tool to clip the CrimeDensity to the pdx\_nbhds. Name the output, DenPdx.
* Run the model
1. **Take a screenshot of your model and insert it into your midterm document.**
2. **Create a map document with 2 data frames. One data frame will be a map showing the number of Homicides & Aggravated Assault crimes by Neighborhood (SeriousCrime\_Nbhd), and the other will show the Density map (DenPdx). Be sure to use appropriate symbology for both maps. Add all necessary map elements, any other data layers you feel are necessary, and apply cartographic concepts.**

**PART IV**

This section will focus on finding, downloading, joining, and mapping data from a tabular source. You can choose your source data, but it must be something you find that is tabular data. A few suggestions: American Fact Finder, Statemaster.com, or Nationmaster.com.

* Find tabular data, bring into excel and format your table to work correctly in ArcGIS
* Download a boundary file that matches the geographic region of your tabular data
* Project your boundary file to an appropriate projection for your chosen geographic region
* Join the table to your boundary file
1. **Create a map of your data. Add all necessary map elements & apply cartographic concepts. Make sure that your map clearly describes your data and map purpose.**