

ETL for MN DNR LIDAR/las data

<https://resources.gisdata.mn.gov/pub/data/elevation/lidar/> (<https://resources.gisdata.mn.gov/pub/data/elevation/lidar/>)

Import modules & set workspace

```
In [ ]: from ftplib import FTP # For downloading/extracting zip files
import arcpy # For converting las to TIN & DEM

# Set workspace to ArcPro folder
arcpy.env.workspace = r'C:\Users\mmMary\Documents\GIS_Classes\GIS_5572\
Labs\Lab2\Lab2_take2.aprx'
```

Collect & prep data

```
In [ ]: # Connect to ftp server

ftp = FTP('ftp.lmic.state.mn.us') # Connect to host with default port
ftp.login() # Use anonymous credentials
'230 Login successful.'
ftp.cwd('/pub/data/elevation/lidar/projects/lakeshady/laz/') # Change
into "lidar" directory
ftp.retrlines('LIST') # List directory contents
```

```
In [ ]: # Download as binary
with open('4342-28-47.laz', 'wb') as fp:
    ftp.retrbinary('RETR 4342-28-47.laz', fp.write) # FTP's RETR comma
nd downloads file

#ftp.quit() # Can quit when transfers are complete
```

```
In [ ]: # .Laz must be converted to a .las to be opened in Pro
arcpy.conversion.ConvertLas(r"C:\Users\mmMary\Documents\GIS_Classes\GIS_
5572\Labs\Lab2\4342-28-47.laz", r"C:\Users\mmMary\Documents\GIS_Classe
s\GIS_5572\Labs\Lab2\las_files", "SAME_AS_INPUT", '', "NO_COMPRESSION",
None, r"C:\Users\mmMary\Documents\GIS_Classes\GIS_5572\Labs\Lab2\las_fi
les\4342-28-47.lasd")
```

Convert .las to TIN

Tool doc for TIN

`arcpy.3d.LasDatasetToTin(in_las_dataset, out_tin, {thinning_type}, {thinning_method}, {thinning_value}, {max_nodes}, {z_factor}, {clip_to_extent})`

```
In [ ]: # Conversion to TIN

arcpy.ddd.LasDatasetToTin("4342-28-47.lasd", "lakeShady_tin", "RANDOM",
"PERCENT", 20)
```

Tool doc for DEM

`arcpy.conversion.LasDatasetToRaster(in_las_dataset, out_raster, {value_field}, {interpolation_type}, {data_type}, {sampling_type}, {sampling_value}, {z_factor})`

```
In [ ]: # Conversion to DEM

arcpy.conversion.LasDatasetToRaster("4342-28-47.lasd", "lakeShady_ras
t", "ELEVATION", "BINNING AVERAGE LINEAR", "FLOAT", "CELLSIZE", 10, 1)
```

Create a map layout & export as PDF

```
In [ ]: # Create layout - Is this possible in code?
```

Export as a pdf

```
In [ ]: import arcpy
# Define the map path
aprx = arcpy.mp.ArcGISProject(r"C:\Users\mmMary\Documents\GIS_Classes\GIS_5572\Labs\Lab2\5572_Lab2.aprx")

# Define & reference TIN & DEM map layouts
dem = aprx.listLayouts("DEM")[0]
tin = aprx.listLayouts("TIN")[0]

# Export layouts to PDF
dem.exportToPDF(r"C:\Users\mmMary\Documents\GIS_Classes\GIS_5572\Labs\Lab2\pdfs\DEM.pdf", resolution = 300)
tin.exportToPDF(r"C:\Users\mmMary\Documents\GIS_Classes\GIS_5572\Labs\Lab2\pdfs\TIN.pdf", resolution = 300)
```