In [ ]:
```
import arcpy
import requests
import os
import zipfile
import io
import sys
```

In [ ]:
```
#Dory Starting Point
arcpy.management.XYTableToPoint(r"C:\Users\siyal\Desktop\UMN MGIS\1st Semester\2. ArcGIS I
\2. Labs\Lab 2\Part 2\Starting & End Points\Dory Starting Point.csv", r"C:\Users\siyal\Docum
ents\ArcGIS\Dora_ArcGIS_Lab02\MyProject3\MyProject3.gdb\DoryStartingPoint_XYTableToPoint",
"Long", "Lat", None, 'GEOGCS["GCS_WGS_1984",DATUM["D_WGS_1984",SPHEROID["WGS_1984",6378137.
0,298.257223563]],PRIMEM["Greenwich",0.0],UNIT["Degree",0.0174532925199433]];-400 -400 1000
00000;-100000 10000;-100000 10000;8.98315284119521E-09;0.001;0.001;IsHighPrecision')
```

In [ ]:
```
#Dory Ending Point
arcpy.management.XYTableToPoint(r"C:\Users\siyal\Desktop\UMN MGIS\1st Semester\2. ArcGIS I
\2. Labs\Lab 2\Part 2\Starting & End Points\Dory Ending Point.csv", r"C:\Users\siyal\Documen
ts\ArcGIS\Dora_ArcGIS_Lab02\MyProject3\MyProject3.gdb\DoryEndingPoint_XYTableToPoint1", "Lon
g", "Lat", None, 'GEOGCS["GCS_WGS_1984",DATUM["D_WGS_1984",SPHEROID["WGS_1984",6378137.0,29
8.257223563]],PRIMEM["Greenwich",0.0],UNIT["Degree",0.0174532925199433]];-400 -400 100000000
0;-100000 10000;-100000 10000;8.98315284119521E-09;0.001;0.001;IsHighPrecision')
```

Select Layer by Attribute

Study Extent (3 Counties)

In [ ]:
```
arcpy.management.SelectLayerByAttribute("mn_county_boundaries_multipart", "NEW_SELECTION",
"COUNTYNAME = 'Wabasha' Or COUNTYNAME = 'Winona' Or COUNTYNAME = 'Olmsted'", None)
```

Streams in the study extent

Using Clip Tool (Vector Data)

In [ ]:
```
arcpy.analysis.Clip("streams_with_strahler_stream_order", "mn_county_boundarie_Dissolve2", r
"C:\Users\siyal\Documents\ArcGIS\Dora_ArcGIS_Lab02\MyProject3\MyProject3.gdb\streams_with_st
rahler_s_Clip", None)
```

Feature to Raster (Streams)

In [ ]:
```
arcpy.conversion.FeatureToRaster("streams_with_strahler_s_Clip", "FW_ID", r"C:\Users\siyal\D
ocuments\ArcGIS\Dora_ArcGIS_Lab02\MyProject3\MyProject3.gdb\Feature_stre1", 276.583641600005
)
```

DEM in the study extent

Using Extract by Mask Tool (Raster Data)

In [ ]:
```
out_raster = arcpy.sa.ExtractByMask("digital_elevation_model_30m", "mn_county_boundarie_Diss
olve2", "INSIDE", '524966.6376 4853462.8394 637916.1448 4922619.9426 PROJCS["NAD_1983_UTM_Zo
ne_15N",GEOGCS["GCS_North_American_1983",DATUM["D_North_American_1983",SPHEROID["GRS_1980",6
378137.0,298.257222101]],PRIMEM["Greenwich",0.0],UNIT["Degree",0.0174532925199433]],PROJECTI
ON["Transverse_Mercator"],PARAMETER["False_Easting",500000.0],PARAMETER["False_Northing",0.
0],PARAMETER["Central_Meridian",-93.0],PARAMETER["Scale_Factor",0.9996],PARAMETER["Latitude_
Of_Origin",0.0],UNIT["Meter",1.0]]'); out_raster.save(r"C:\Users\siyal\Documents\ArcGIS\Dora
_ArcGIS_Lab02\MyProject3\MyProject3.gdb\Extract_digi1")
```

DEM percentage rise using slope tool

In [ ]:
```
arcpy.ddd.Slope("DEM_Study_Extent", r"C:\Users\siyal\Documents\ArcGIS\Dora_ArcGIS_Lab02\MyPr
oject3\MyProject3.gdb\Slope_Extrac1", "PERCENT_RISE", 1, "PLANAR", "METER")
```

Roads in the study extent

Using Extract by Mask Tool (Raster Data)

In [ ]:
```
out_raster = arcpy.sa.ExtractByMask("NLCD 2019 - Imperviousness", "mn_county_boundarie_Disso
lve2", "INSIDE", '524966.6376 4853462.8394 637916.1448 4922619.9426 PROJCS["NAD_1983_UTM_Zon
e_15N",GEOGCS["GCS_North_American_1983",DATUM["D_North_American_1983",SPHEROID["GRS_1980",63
78137.0,298.257222101]],PRIMEM["Greenwich",0.0],UNIT["Degree",0.0174532925199433]],PROJECTIO
N["Transverse_Mercator"],PARAMETER["False_Easting",500000.0],PARAMETER["False_Northing",0.
0],PARAMETER["Central_Meridian",-93.0],PARAMETER["Scale_Factor",0.9996],PARAMETER["Latitude_
Of_Origin",0.0],UNIT["Meter",1.0]]'); out_raster.save(r"C:\Users\siyal\Documents\ArcGIS\Dora
_ArcGIS_Lab02\MyProject3\MyProject3.gdb\Extract_NLCD1")
```

Land Cover & Land Use in the study extent

Using Extract by Mask Tool (Raster Data)

In [ ]:
```
out_raster = arcpy.sa.ExtractByMask("NLCD_2019_Land_Cover.tif", "mn_county_boundarie_Dissolv
e2", "INSIDE", '524966.6376 4853462.8394 637916.1448 4922619.9426 PROJCS["NAD_1983_UTM_Zone_
15N",GEOGCS["GCS_North_American_1983",DATUM["D_North_American_1983",SPHEROID["GRS_1980",6378
137.0,298.257222101]],PRIMEM["Greenwich",0.0],UNIT["Degree",0.0174532925199433]],PROJECTION
["Transverse_Mercator"],PARAMETER["False_Easting",500000.0],PARAMETER["False_Northing",0.0],
PARAMETER["Central_Meridian",-93.0],PARAMETER["Scale_Factor",0.9996],PARAMETER["Latitude_Of_
Origin",0.0],UNIT["Meter",1.0]]'); out_raster.save(r"C:\Users\siyal\Documents\ArcGIS\Dora_Ar
cGIS_Lab02\MyProject3\MyProject3.gdb\Extract_NLCD2")
```

Reclassification of Input Layers to Standardized scale

Streams Layer

Reclassify the layer by assigning preferences (1-Highest ; 9-Lowest)

In [ ]:
```
arcpy.ddd.Reclassify("Streams Raster Layer", "Value", "0 13757 1;13757 27514 2;27514 41271
 3;41271 55028 4;55028 68785 5;68785 82542 6;82542 96299 7;96299 110056 8;110056 123813 9;NO
DATA 1", r"C:\Users\siyal\Documents\ArcGIS\Dora_ArcGIS_Lab02\MyProject3\MyProject3.gdb\Recla
ss_Feat4", "DATA")
```

DEM Data

Reclassify the data by assigning preferences (1-Highest ; 9-Lowest)

In [ ]:
```
arcpy.ddd.Reclassify("Slope_Extrac1", "VALUE", "0 3 1;3 6 2;6 10 3;10 15 4;15 20 5;20 25 5;2
5 30 6;30 40 6;40 60 7;60 100 8;100 1000 9", r"C:\Users\siyal\Documents\ArcGIS\Dora_ArcGIS_L
ab02\MyProject3\MyProject3.gdb\Reclass_Slop4", "DATA")
```

Road Data

Reclassify the data by assigning preferences (9-Highest ; 1-Lowest)

In [ ]:
```
arcpy.ddd.Reclassify("Roads_Study_Extent", "Value", "0 9 9;9 28 7;28 49 5;49 72 3;72 100 1",
r"C:\Users\siyal\Documents\ArcGIS\Dora_ArcGIS_Lab02\MyProject3\MyProject3.gdb\Reclass_Extr3"
, "DATA")
```

Land Cover

Reclassify the data by assigning preferences

In [ ]:
```
arcpy.ddd.Reclassify("Land_Cover", "NLCD_Land", "'Open Water' 9;'Developed, Open Space' 1;'D
eveloped, Low Intensity' 3;'Developed, Medium Intensity' 3;'Developed, High Intensity' 4;'Ba
rren Land' 1;'Deciduous Forest' 7;'Evergreen Forest' 8;'Mixed Forest' 7;Shrub/Scrub 5;Herbac
eous 7;Hay/Pasture 9;'Cultivated Crops' 9;'Woody Wetlands' 9;'Emergent Herbaceous Wetlands'
 8", r"C:\Users\siyal\Documents\ArcGIS\Dora_ArcGIS_Lab02\MyProject3\MyProject3.gdb\Reclass_E
xtr5", "DATA")
```

Weighted Overlay

Assigning equal weights to all inputs

In [ ]:
```
out_raster = arcpy.sa.WeightedOverlay(r"('C:\Users\siyal\Documents\ArcGIS\Dora_ArcGIS_Lab02
\MyProject3\MyProject3.gdb\Reclass_Slop4' 25 'Value' (1 1; 2 2; 3 3; 4 4; 5 5; 6 6; 7 7; 8
 8; 9 9; NODATA NODATA); 'C:\Users\siyal\Documents\ArcGIS\Dora_ArcGIS_Lab02\MyProject3\MyPro
ject3.gdb\Reclass_Extr3' 25 'Value' (1 1; 3 3; 5 5; 7 7; 9 9; NODATA NODATA); 'C:\Users\siya
l\Documents\ArcGIS\Dora_ArcGIS_Lab02\MyProject3\MyProject3.gdb\Reclass_Extr5' 25 'Value' (1
 1; 3 3; 4 4; 5 5; 7 7; 8 8; 9 9; NODATA NODATA); 'C:\Users\siyal\Documents\ArcGIS\Dora_ArcG
IS_Lab02\MyProject3\MyProject3.gdb\Extract_Recl2' 25 'Value' (1 1; 8 8; 9 9; NODATA NODAT
A));1 9 1"); out_raster.save(r"C:\Users\siyal\Documents\ArcGIS\Dora_ArcGIS_Lab02\MyProject3
\MyProject3.gdb\Weighte_Recl2")
```

Cost Distance Tool

In [ ]:
```
out_distance_raster = arcpy.sa.CostDistance("DoryStartingPoint_XYTableToPoint", "Weighted_Ov
erlay", None, r"C:\Users\siyal\Documents\ArcGIS\Dora_ArcGIS_Lab02\MyProject3\MyProject3.gdb
\cost_direction", None, None, None, None, ''); out_distance_raster.save(r"C:\Users\siyal\Doc
uments\ArcGIS\Dora_ArcGIS_Lab02\MyProject3\MyProject3.gdb\CostDis_Dory1")
```

Cost Path As Polyline Tool

In [ ]:
```
arcpy.sa.CostPathAsPolyline("DoryEndingPoint_XYTableToPoint1", "CostDis_Dory1", "cost_direct
ion", r"C:\Users\siyal\Documents\ArcGIS\Dora_ArcGIS_Lab02\MyProject3\MyProject3.gdb\CostPat_
DoryEnd1", "BEST_SINGLE", "OBJECTID", "INPUT_RANGE")
```