CHULA ENGINEERING
Innovation toward Sustainability | ACTNOW

INTRODUCTION TO JAVASCRIPT

Geospatial Programming

Modern Integrated Surveying Technologies 2024

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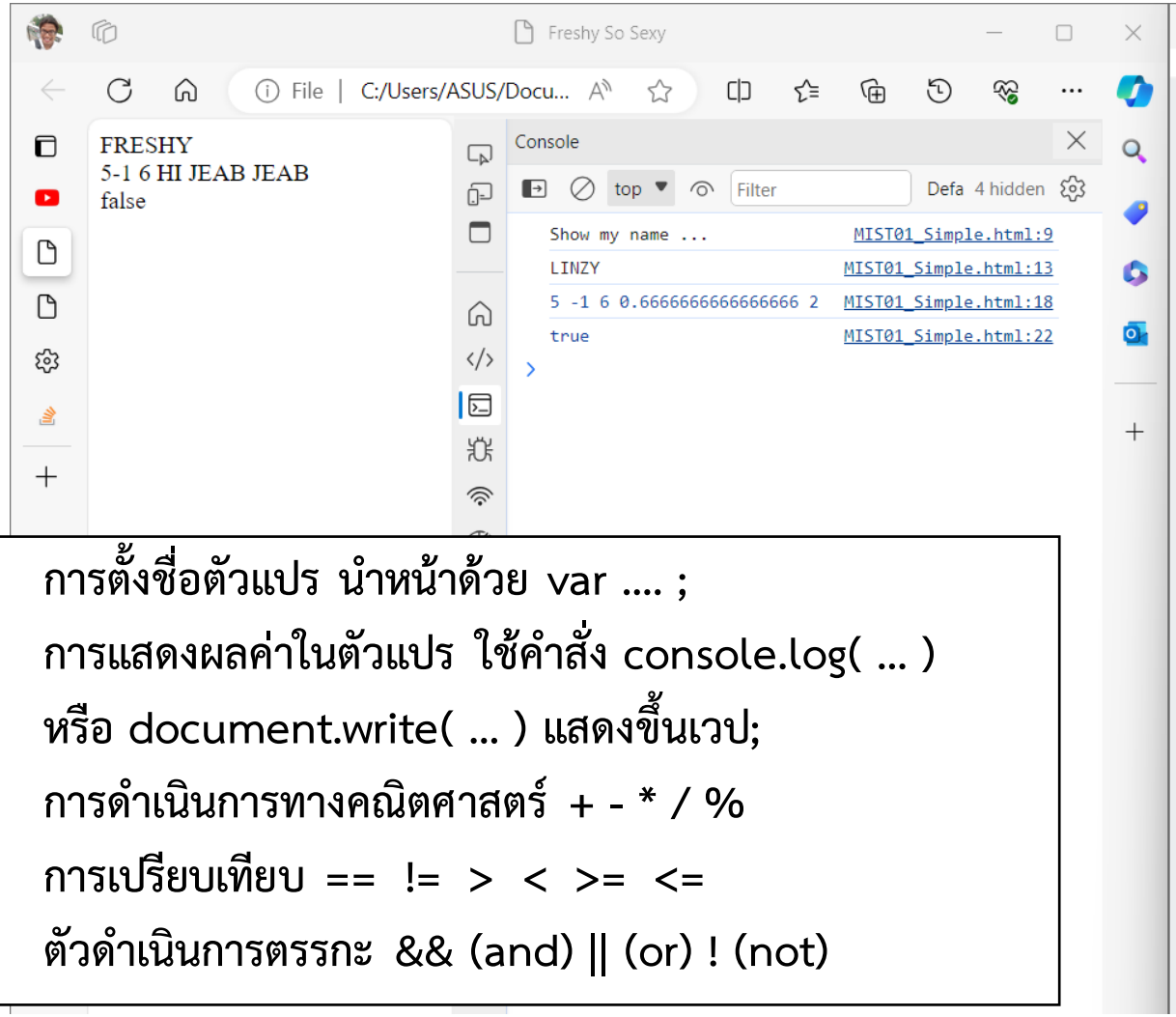
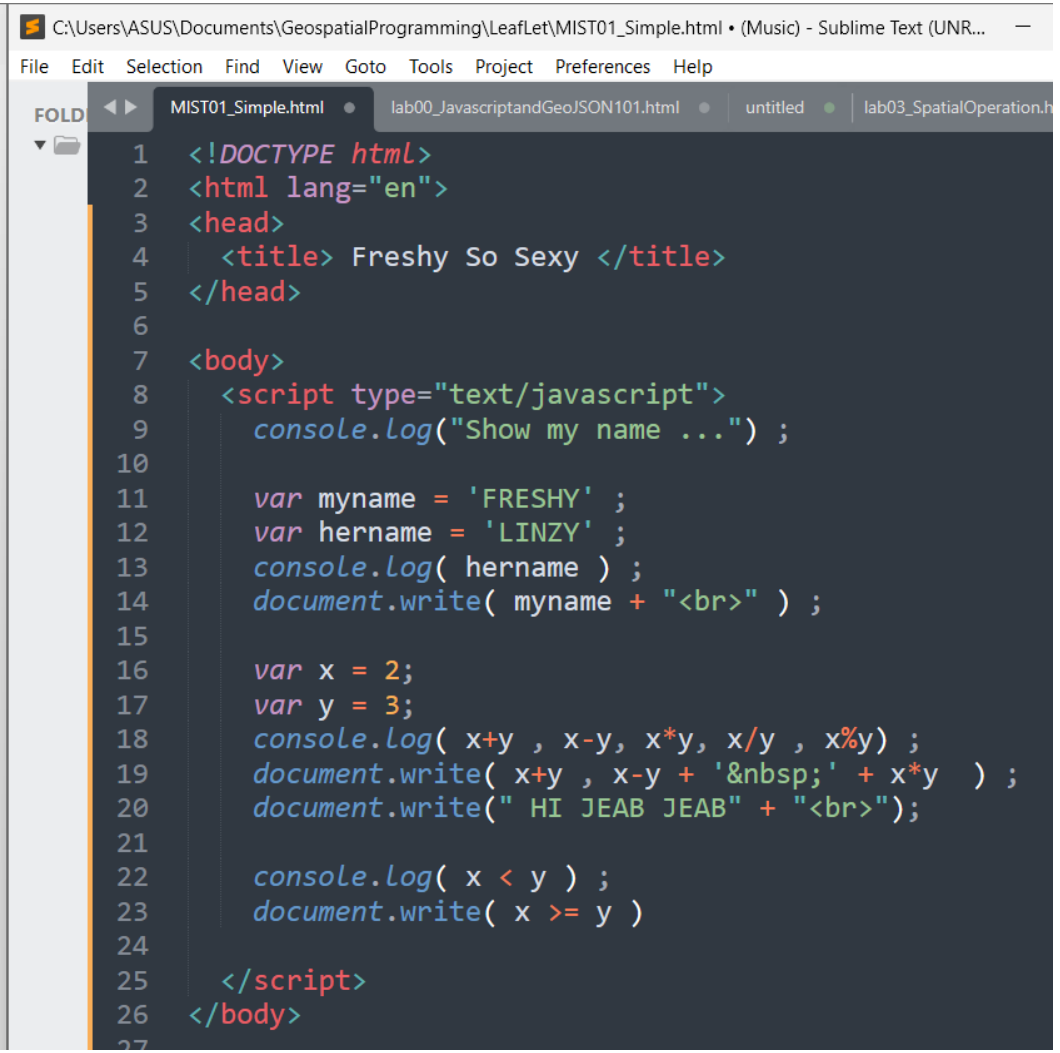
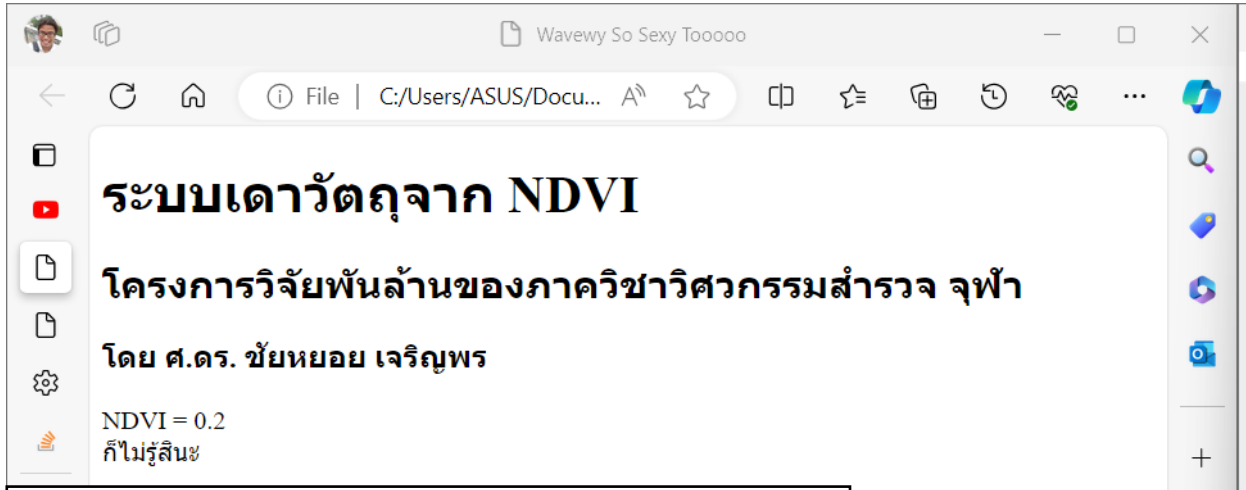
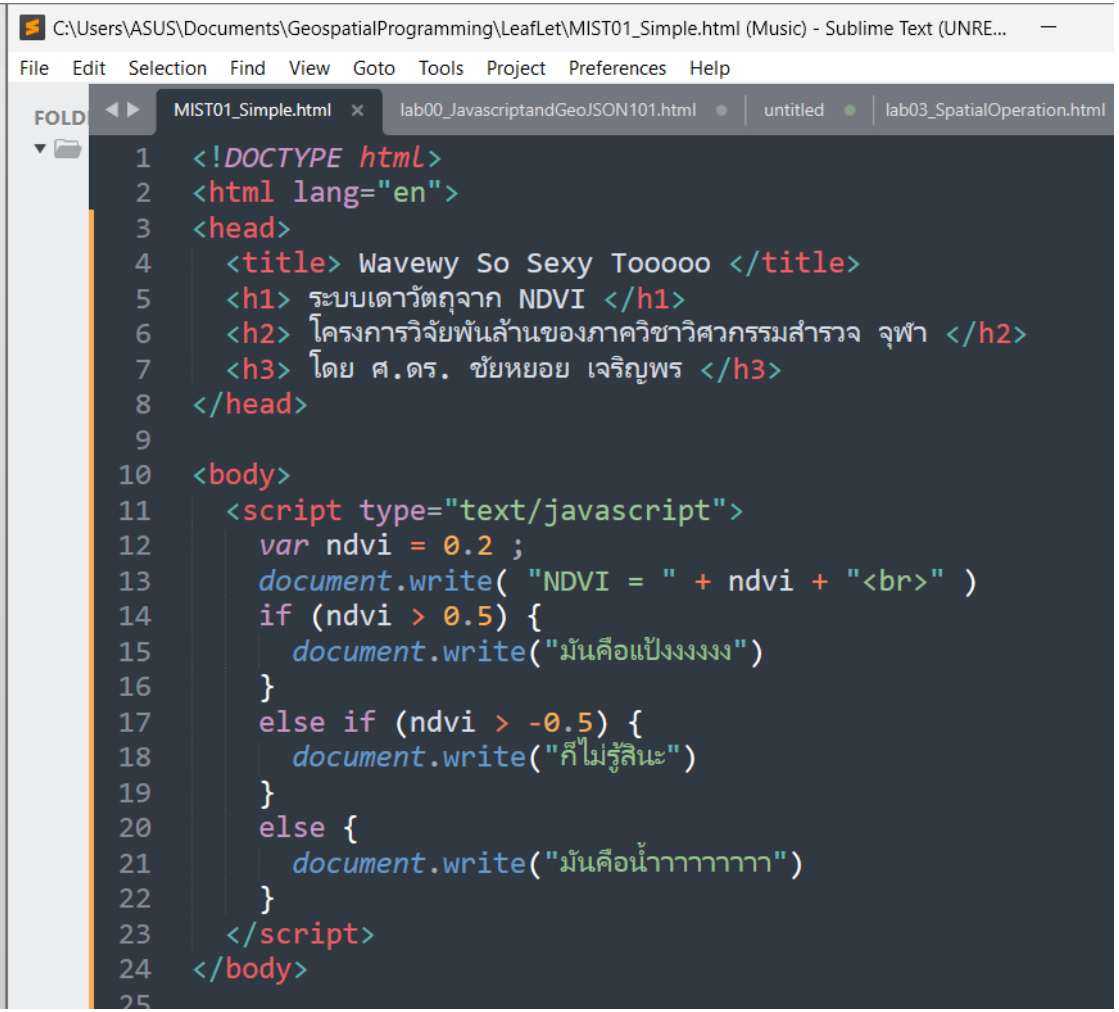


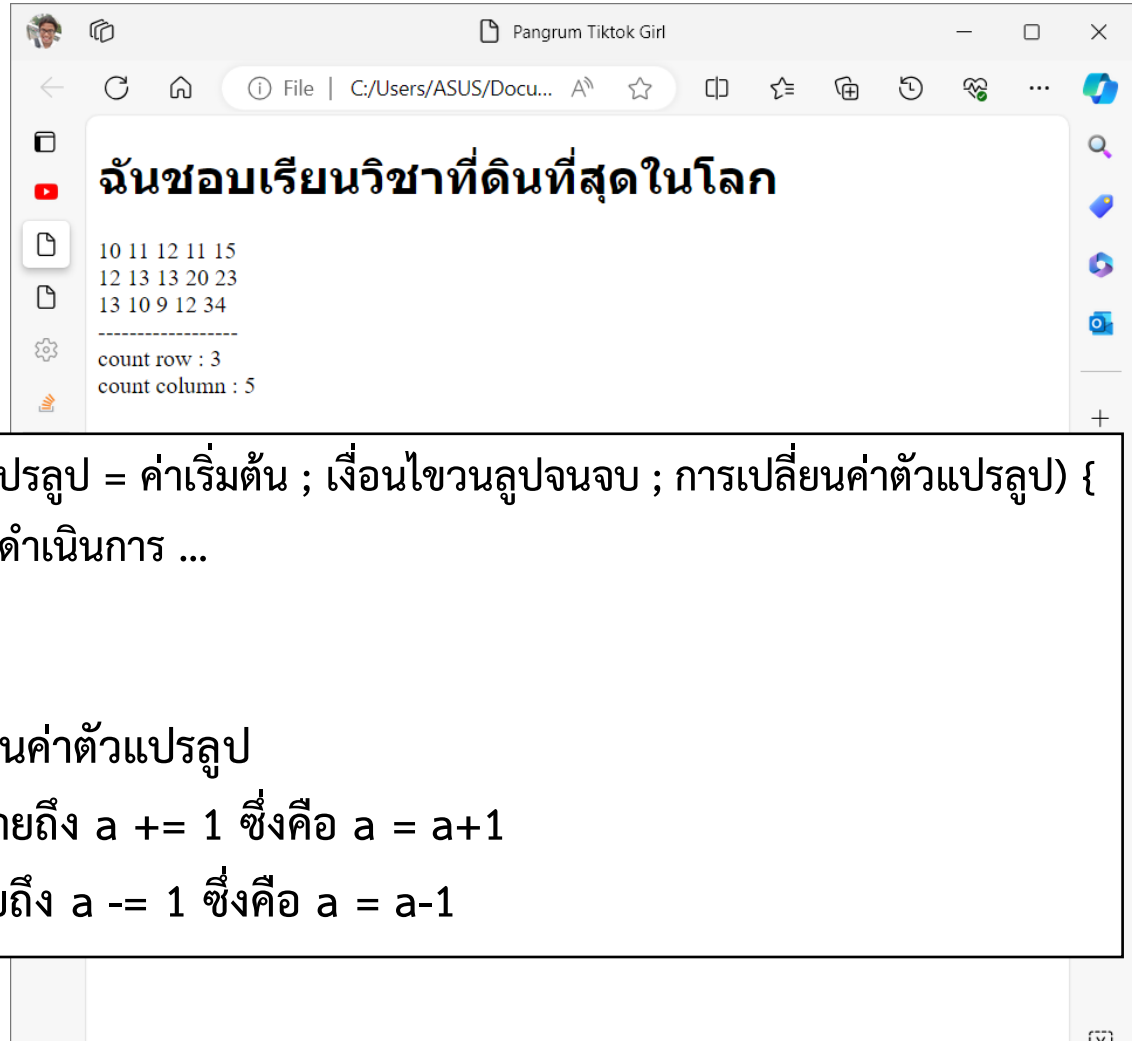
- การตั้งชื่อตัวแปร นำหน้าด้วย var .... ;
- การแสดงผลค่าในตัวแปร ใช้คำสั่ง console.log(...) หรือ document.write(...) แสดงขึ้นเวป;
- การดำเนินการทางคณิตศาสตร์ + - * / %
- การเปรียบเทียบ == != > < >= <=
- ตัวดำเนินการตรรกะ && (and) || (or) ! (not)






```
if (เงื่อนไข 1) {
        ทำตามคำสั่ง เมื่อตรงเงื่อนไข 1
}
else if (เงื่อนไข 2) {
        ทำตามคำสั่ง เมื่อตรงเงื่อนไข 2
}
else {
        ทำตามคำสั่ง เมื่อตรงเงื่อนไขนอกเหนือก่อนหน้า
}
```





for (ตัวแปรลูป = ค่าเริ่มต้น ; เงื่อนไขวนลูปจนจบ ; การเปลี่ยนค่าตัวแปรลูป) {

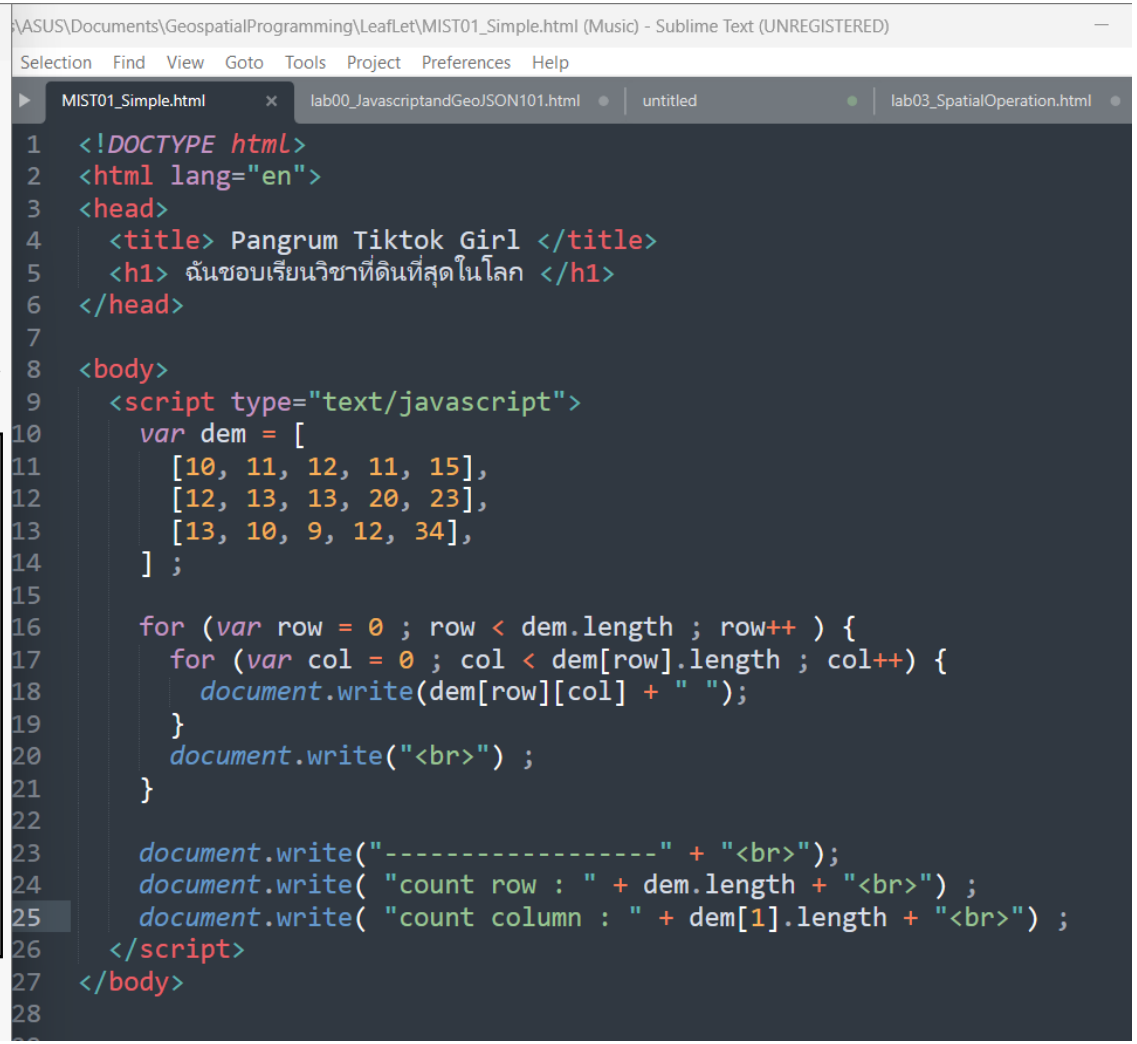
    คำสั่งดำเนินการ ...

}

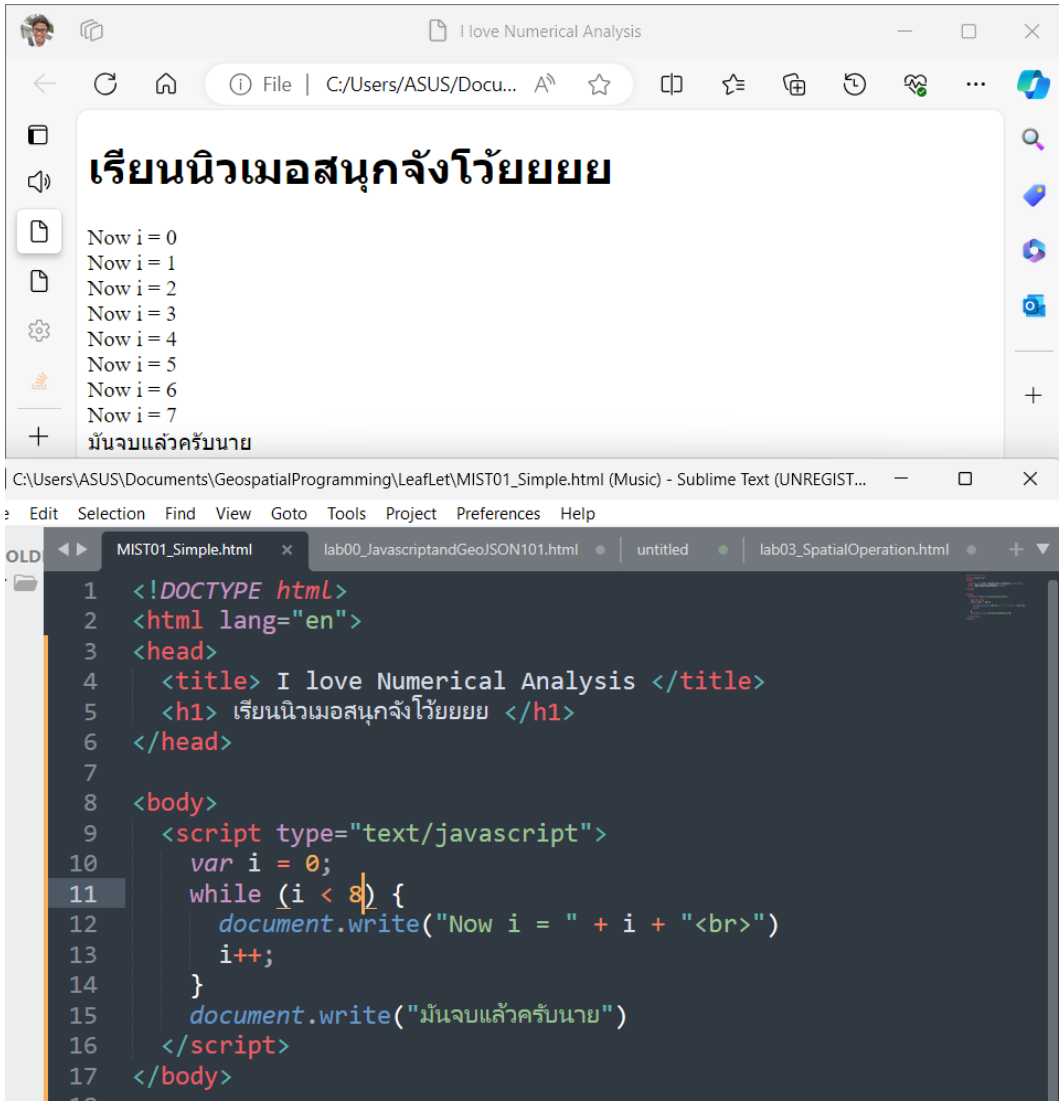
การเปลี่ยนค่าตัวแปรลูป

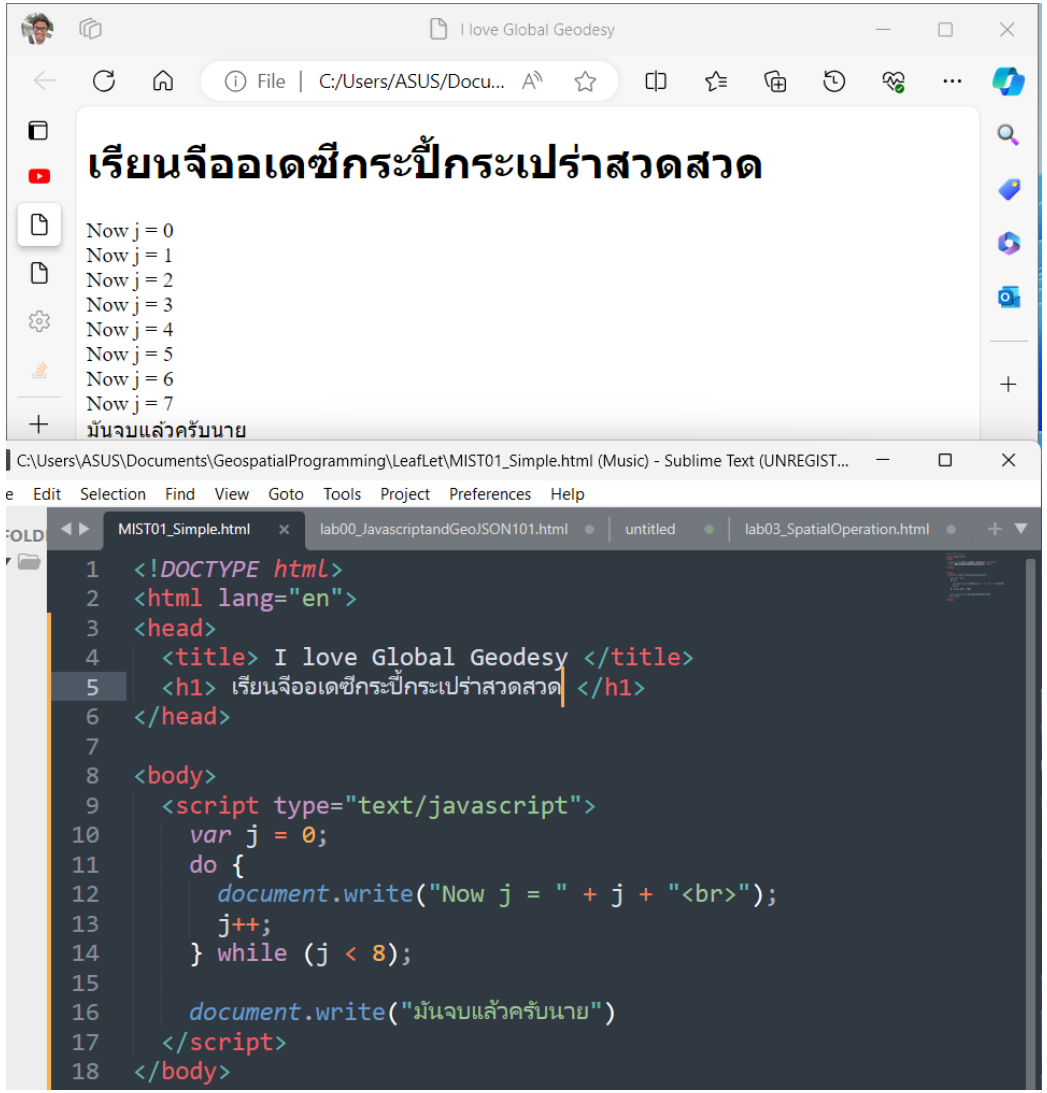
a++ หมายถึง a += 1 ซึ่งคือ a = a+1

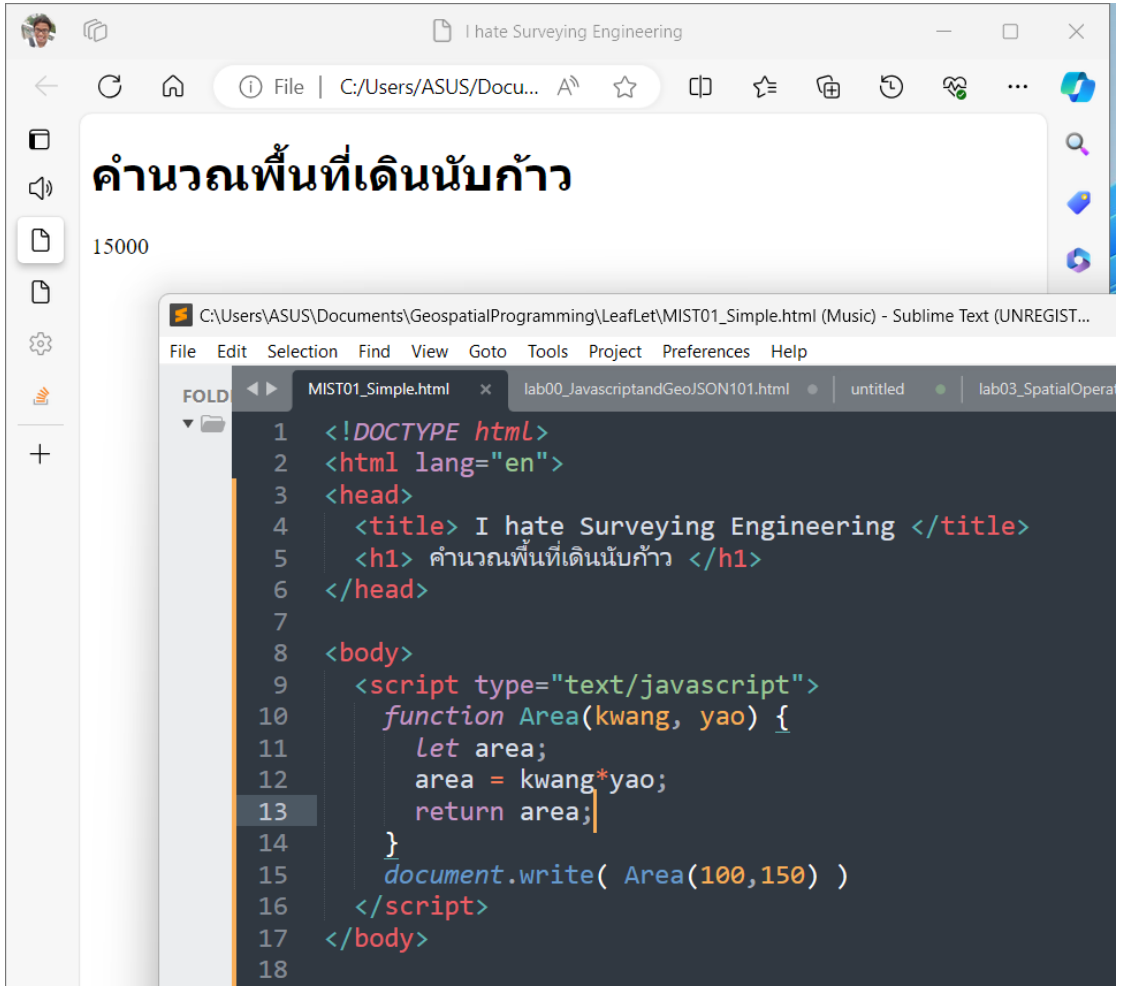
a-- หมายถึง a -= 1 ซึ่งคือ a = a-1

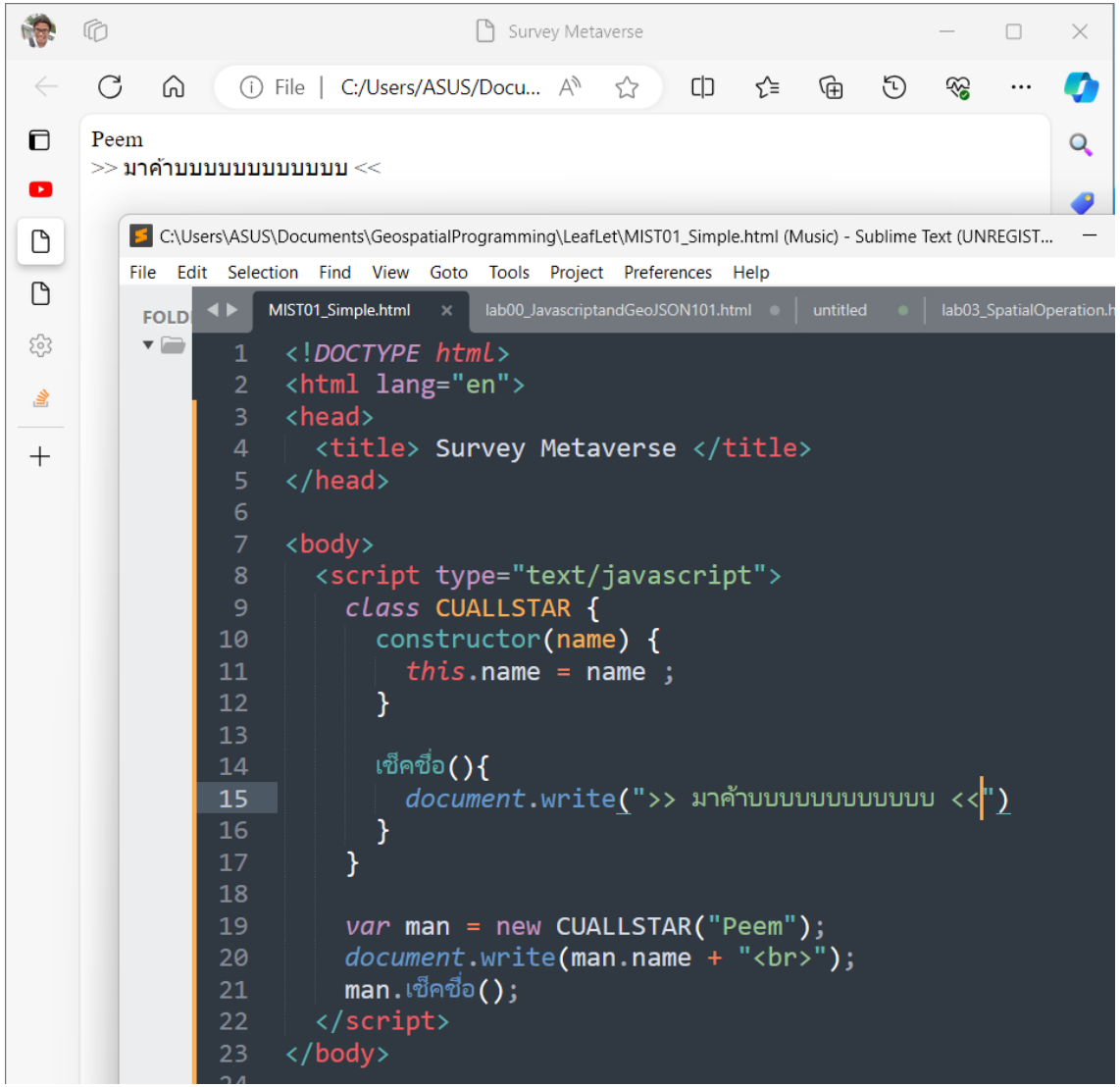


JAVASCRIPT101 : LOOPING [WHILE-LOOP]






I hate Surveying Engineering
File | C:/Users/ASUS/Docu...
คำนวณพื้นที่เดินนับก้าว
15000
C:\Users\ASUS\Documents\GeospatialProgramming\LeafLet\MIST01_Simple.html (Music) - Sublime Text (UNREGIST...
File Edit Selection Find View Goto Tools Project Preferences Help
MIST01_Simple.html
lab00_JavascriptandGeoJSON101.html
untitled
<!DOCTYPE html>
<html lang="en">
<head>
<title> I hate Surveying Engineering </title>
<h1> คำนวณพื้นที่เดินนับก้าว </h1>
</head>
<body>
<script type="text/javascript">
function Area(kwang, yao) {
let area;
area = kwang*yao;
return area;
}
document.write(Area(100,150))
</script>
</body>


Survey Metaverse
File | C:/Users/ASUS/Docu...
Peem
>> มาค้าบบบบบบบบบบบบ <<
C:\Users\ASUS\Documents\GeospatialProgramming\LeafLet\MIST01_Simple.html (Music) - Sublime Text (UNREGIST...
File Edit Selection Find View Goto Tools Project Preferences Help
MIST01_Simple.html
lab00_JavascriptandGeoJSON101.html
untitled
<!DOCTYPE html>
<html lang="en">
<head>
<title> Survey Metaverse </title>
</head>
<body>
<script type="text/javascript">
class CUALLSTAR {
constructor(name) {
this.name = name ;
}
เซ็คชื่อ(){
document.write(">> มาค้าบบบบบบบบบบบบ <<")
}
}
var man = new CUALLSTAR("Peem");
document.write(man.name + "
");
man.เซ็คชื่อ();
</script>
</body>

GEO + JSON(Javascript Object Notation)

GeoJSON is a format for encoding a variety of geographic data structures.

```
var df = {
  "type": "FeatureCollection",
  "name": "hospital",
  "crs": { "type": "name", "properties": { "name": "urn:ogc:def:crs:OGC:1.3:CRS84" } },
  "features": [
  { "type": "Feature", "properties": { "AREA": 0.0, "PERIMETER": 0.0, "PLACES_": 1349, "PLACES_ID": 1349, "PLACE_ID": 0
    , "PL_TYPE": 23, "PL_NAME_E": "Tron Hospital", "PL_NAME_T": "[illegible]" }, "geometry": { "type": "Point", "
    coordinates": [ 100.141144656353475, 17.446184746008033 ] } },
  { "type": "Feature", "properties": { "AREA": 0.0, "PERIMETER": 0.0, "PLACES_": 1350, "PLACES_ID": 1350, "PLACE_ID": 0
    , "PL_TYPE": 23, "PL_NAME_E": "Tha Pla Hospital", "PL_NAME_T": "[illegible]" }, "geometry": { "type": "Point",
     "coordinates": [ 100.375906852463331, 17.795520932056949 ] } },
  { "type": "Feature", "properties": { "AREA": 0.0, "PERIMETER": 0.0, "PLACES_": 1351, "PLACES_ID": 1351, "PLACE_ID": 0
    , "PL_TYPE": 23, "PL_NAME_E": "Nam Pad Hospital", "PL_NAME_T": "[illegible]" }, "geometry": { "type": "Point", "
    coordinates": [ 100.677952650657588, 17.727086818963244 ] } }
  ]
}
```

GeoJSON supports the following geometry types: *Point, LineString, Polygon, MultiPoint, MultiLineString, and MultiPolygon*. Geometric objects with additional properties are **Feature** objects.
Sets of features are contained by **FeatureCollection** objects.

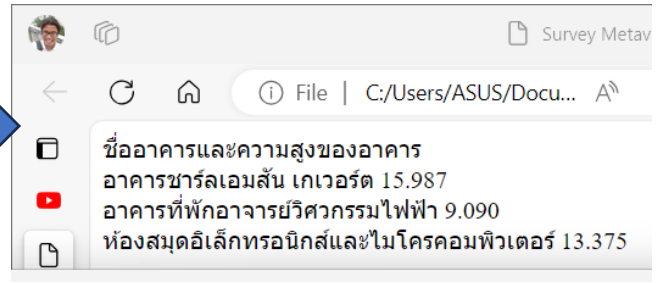
GeoJSON Operation : Example

```
var mypolygon = {
    "type": "FeatureCollection",
    "name": "Building",
    "crs": { "type": "name", "properties": { "name"
      : "urn:ogc:def:crs:OGC:1.3:CRS84" } },
    "features": [
    { "type": "Feature", "properties": { "fid": 9,
      "Name": "อาคารชาร์ลเอมสัน เกเวอร์ต", "h": 15.
      987461663515655}, "geometry": { "type": "
      MultiPolygon", "coordinates": [ [ [ [ 100.
      532399706, 13.736248581 ], [ 100.532019704,
      13.736303882 ], [ 100.532041639, 13.736443883
       ], [ 100.532422915, 13.736388575 ], [ 100.
      532399706, 13.736248581 ] ] ] ] } },
    { "type": "Feature", "properties": { "fid": 10,
       "Name": "อาคารที่พักอาจารย์วิศวกรรมไฟฟ้า", "h": 9.09
      }, "geometry": { "type": "MultiPolygon", "
      coordinates": [ [ [ [ 100.532293299, 13.
      736247374 ], [ 100.532383682, 13.736233733 ],
       [ 100.532365687, 13.736111769 ], [ 100.
      532274026, 13.736124795 ], [ 100.532293299,
      13.736247374 ] ] ] ] } },
    { "type": "Feature", "properties": { "fid": 11,
       "Name": "ห้องสมุดอิเล็กทรอนิกส์และไมโครคอมพิวเตอร์", "h
      ": 13.375261663515653}, "geometry": { "type":
       "MultiPolygon", "coordinates": [ [ [ [ 100.
      532267892, 13.736259365 ], [ 100.532243961,
      13.736106297 ], [ 100.532108361, 13.736122709
       ], [ 100.532131034, 13.736278277 ], [ 100.
      532267892, 13.736259365 ] ] ] ] } },]
  }
```

```
document.write('ชื่ออาคารและความสูงของอาคาร' + "<br>")

df = mypolygon.features
for (var b in df) {
  document.write(df[b].properties.Name + ' ' +
    (df[b].properties.h).toFixed(3) + "<br>")

}
```




```
// Building Ellipsoidal Height
var report = mypolygon.features.map( (item) => {
    let bname = item.properties.Name;
    let hae = item.properties.h;
    return { name : bname, HAE : parseInt(hae)};
  });

console.log(report)
```

```
(3) [{…}, {…}, {…}]
▶ 0: {name: 'อาคารชาร์ลเอมสัน เกเวอร์ต', HAE: 15}
▶ 1: {name: 'อาคารที่พักอาจารย์วิศวกรรมไฟฟ้า', HAE: 9}
▶ 2: {name: 'ห้องสมุดอิเล็กทรอนิกส์และไมโครคอมพิวเตอร์', HAE: 13}
  length: 3
▶ [[Prototype]]: Array(0)
```

```
var bd = mypolygon.features.filter( (item) => {
    return item.properties.h > 10
    });
console.log( bd )
```

```
MIST01_Simple.html:31
▼ (2) [{…}, {…}]
▼ 0:
  ▶ geometry: {type: 'MultiPolygon', coordinates: Array(1)}
  ▶ properties: {fid: 9, Name: 'อาคารชาร์ลเอมสัน เกเวอร์ต', h: 15.987461663515655}
    type: "Feature"
  ▶ [[Prototype]]: Object
▼ 1:
  ▶ geometry: {type: 'MultiPolygon', coordinates: Array(1)}
  ▶ properties: {fid: 11, Name: 'ห้องสมุดอิเล็กทรอนิกส์และไมโครคอมพิวเตอร์', h: 13.375261663
    type: "Feature"
  ▶ [[Prototype]]: Object
  length: 2
▶ [[Prototype]]: Array(0)
```

```
var bdSUM = bd.reduce( (sum,item) => {
  return sum + item.properties.h
  },0);
console.log(bdSUM)
```

```
29.362723327031308
```

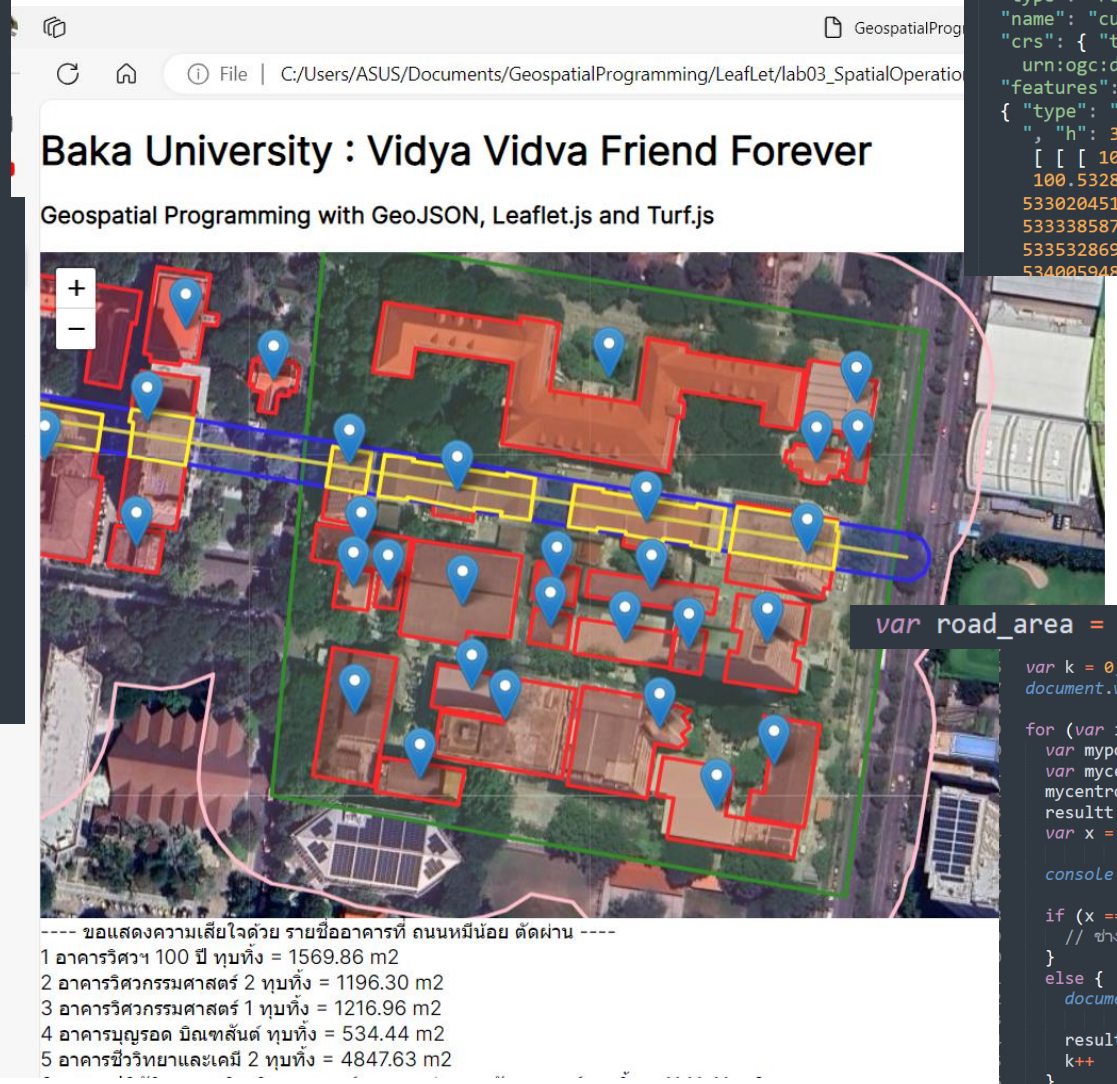
```
// Show map at Chula Engineering
const map = L.map('map').setView([13.7365, 100.532], 17);
// Base Map
const googleSat = L.tileLayer('http://{s}.google.com/vt/
  lyrs=s&x={x}&y={y}&z={z}',{
    maxZoom: 20,
    subdomains:['mt0','mt1','mt2','mt3']
  }).addTo(map);
```

```
// Layer Visualization
L.geoJSON( eng, {
  style: function (feature) {
    return {color: "green"};
  },
  } ).addTo(map)

// Layer Visualization
L.geoJSON( mypolygon, {
  style: function (feature) {
    return {color: "red"};
  },
    onEachFeature: function (feature,layer) {
    layer.bindPopup(feature.properties.Name)
  }
} ).addTo(map)
```

```
L.geoJSON( road_area, {
    style: function (feature) {
      return {color: "blue"};
    },
    } ).addTo(map)
```

```
L.geoJSON( result, {
    style: function (feature) {
      return {color: "yellow"};
    },
    } ).addTo(map)
```




```
var mypolygon = {
  "type": "FeatureCollection",
  "name": "cuSciEng_Building",
  "crs": { "type": "name", "properties": { "name": "
    urn:ogc:def:crs:OGC:1.3:CRS84" } },
  "features": [
  { "type": "Feature", "properties": { "fid": 1, "Name": "อาคารวิศวกรรมศาสตร์ 3
    ", "h": 31.337 }, "geometry": { "type": "MultiPolygon", "coordinates": [
     [ [ [ 100.532269405, 13.737039278 ], [ 100.532313651, 13.737312083 ], [
     100.532863632, 13.737228819 ], [ 100.532865421, 13.737252762 ], [ 100.
    533020451, 13.737227845 ], [ 100.532979564, 13.736969392 ], [ 100.
    533338587, 13.736912864 ], [ 100.53337784, 13.737171328 ], [ 100.
    533532869, 13.73714641 ], [ 100.53353277
    534005948, 13.737044458 ], [ 100.533968
```

```
var road = {
  "type": "FeatureCollection",
  "name": "Santitamnont Rd.",
  "features": [
    {
      "type": "Feature",
      "properties": {
        'fid' : 1,
        'name' : 'Phisan Rd.'
      },
      "geometry": {
        "coordinates": [
          [
            100.53441983039465,
            13.736316000119672
          ],
          [
```

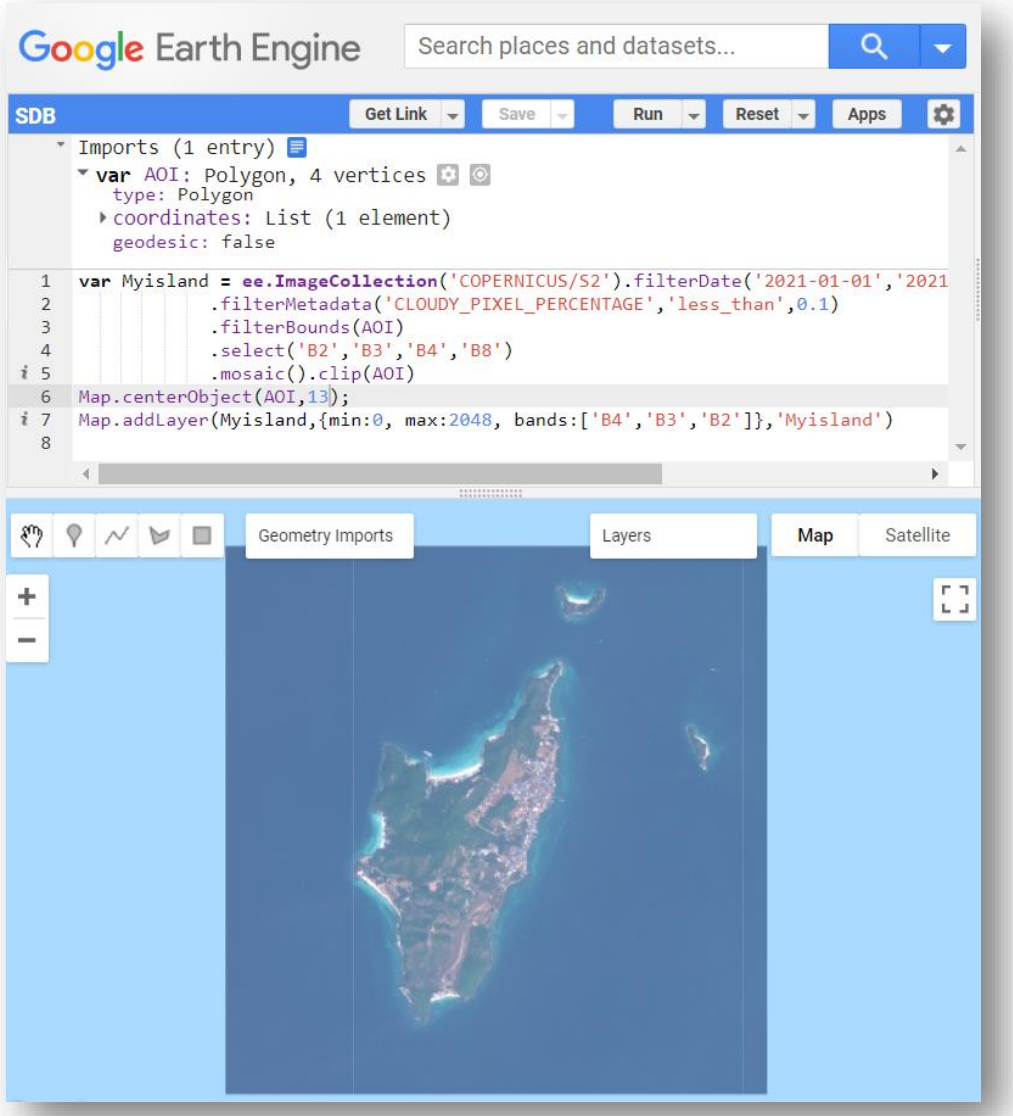
```
var road_area = turf.buffer( road , 10 , {units:"meters"} )
```

```
var k = 0;
document.write('---- ขอแสดงความเสียใจด้วย รายชื่ออาคารที่ ถนนหมีน้อย ตัดผ่าน ---- <br>')

for (var i = 0; i < mypolygon.features.length; i++)  {
  var mypolygon_now = mypolygon.features[i]
  var mycentroid_now = turf.centroid( mypolygon_now)
  mycentroid_now.properties.h = mypolygon_now.properties.h
  resultt.features.push( mycentroid_now )
  var x = turf.intersect( mypolygon_now,
                          road_area.features[0] )
  console.log(x)

  if (x == null) {
    // ช่างแม่มัน ช่างแม่ม้านนนนน ..... อ ิ
  }
  else {
    document.write(k+1,' ',mypolygon_now.properties.Name, ' ', 'ทุบทิ้ง =',
                   ' ', (turf.area(mypolygon_now)).toFixed(2), ' ', 'm2' +'<br>')
    result.features.push(x)
    k++
  }
}
```

https://developers.google.com/earth-engine/guides/getstarted



Google Earth Engine with Java programming

https://code.earthengine.google.com/

สำหรับ python programming สามารถทำได้ผ่าน Google Colab

https://colab.research.google.com/

THE END ....

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