**Hill shade, Slope, and Viewshed Analysis  
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**Project Overview**

This lab focused on using raster-based terrain modeling tools to derive slope, aspect, and visibility data from a Digital Elevation Model (DEM). Students examined how light direction (azimuth) affects hillshade visualization and applied local spatial functions to calculate slope and aspect across a mountainous landscape. The main objective was to identify suitable lookout points and determine their corresponding viewsheds — areas visible from those points — considering slope and orientation constraints. The lab culminated in generating 2D and 3D visualizations of viewshed extents and elevation profiles to support trail planning and site selection for scenic observation.

**Graphic 1: Viewshed and Elevation Overlay Map**

**Description:**  
This map shows the view raster layer denoting visible areas (suitable viewsheds) rendered in black, overlaid on a colored elevation raster with hillshade for enhanced terrain contrast. The transparency of the elevation layer allows the hillshade to give depth while preserving color cues. A scale bar and legend are included for spatial reference. This map identifies optimal lookout areas in a topographically complex region.

A screenshot of a map

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**Graphic 2: Elevation Profile Along Hiking Path**

**Description:**  
This figure captures a selected lookout point, a trail path, and the corresponding elevation profile. The path length and total elevation gain/loss are visualized to support trail difficulty assessment. Including both the elevation profile and map layout helps relate spatial features with real-world terrain experience. This tool is valuable in environmental recreation planning.

A screenshot of a computer screen

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**Graphic 3: 3D Viewshed Visualization**

**Description:**  
The final visualization renders the DEM in 3D with the viewshed layer applied. Visible areas are semi-transparent, while obstructed areas are rendered fully transparent to highlight terrain visibility limits. This 3D model offers a compelling visual of topographic influence on sightlines and is enhanced by optional contour lines to improve terrain readability.

A green and white landscape

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