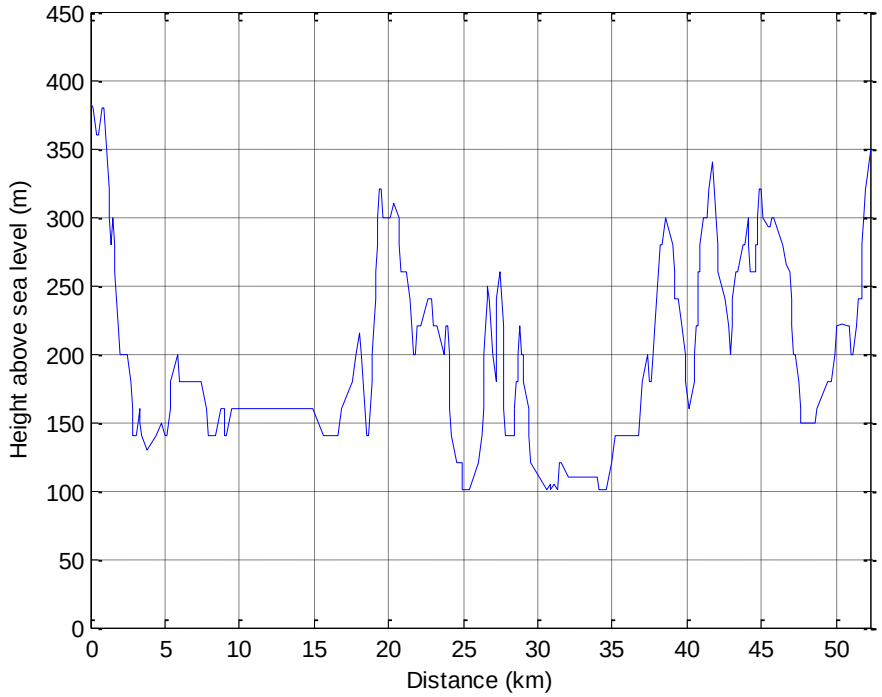
Exercise 5

6.2
A ray is launched at an angle of 1° to the Earth's surface. The refractivity is constant at 300 N-units between the ground and 50 m, when it abruptly decreases to 250 N-units. What is the new elevation angle of the ray?

6.4mod
Calculate the total attenuation for a 4 km path, with equal antenna height antennas, and three knife-edges with excess heights of 50 m, 100 m and 50 m (in that order) equally spaced along the path at 100 MHz, using the Deygout method.

6.6mod
When a diffracting obstacle is below the direct path between a transmitter and receiver, the excess loss may be lower at higher frequencies. Why? Does this imply that the total loss is lower?

6.new
The path profile of a 6 GHz radio link is shown below. The heights can be found in the file terrainprofile.txt. The file contains two columns where the first column gives the distance (km) from one side (left) and the second column gives the height (m) above the sea level.



Choose to locate a transmitter at the left side 20 m above the terrain. Estimate minimum height for the receiver at the right side for normal atmospheric conditions respecting a path clearance of $0.6r_1$ where r_1 is the first Fresnel zone. Will the clearance be larger or smaller under ducting conditions?