Problem #1 Given a 1 GHz quarter-wave antenna at the origin, excited by a 1.0 A amplitude current, calculate the power returned if a target with a scattering-cross-section $\sigma = 10^{-4} \text{m}^2$ is located 1 km away at an elevation of 50 degrees $\theta = 40^\circ$.

Problem 2. Develop a program that will calculate the received power as a function of frequency (100 MHz – 10 GHz) for the antenna in problem 1 and plot the result.

Problem 3. Using 10 quarter wave antennas placed in an array pattern along the z axis each separated by a half wavelength, determine the phases on the excitation currents needed to make the signal peak at $\theta = 40^\circ$. What is the improvement on the echo strength?