Electromagnetic Waves in Lossy Media

Reading assignment
Ulaby, 7-4, 7-6.2
Connor and Salon, Unit IX

Problem 1 - Lossy media parameters
Find the values α, β, λ and η for an electromagnetic wave traveling through seawater (ε_r = 72, σ = 4 S/m) at 10 MHz? Repeat the calculation for the a 100 GHz frequency.

Problem 2 - Energy & Power - lossy media
A 10 MHz wave is polarized in the x direction and propagates in the +z direction in seawater. At z=0, it has a power density of 10 W/m^2 (Use the results of Problem 1).
a.   Write the electric and magnetic fields in phasor form.
b.   Write the electric field in time domain form.
c.   At what value of z will the power density of the wave be 1% of its initial power?